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08 Has Microsoft Lost Its Way?

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18 Google I/O 2016

Never one to stand still, Google has been hard at work, developing new software and hardware products. We know this because, as it's done previously, it announced a whole raft them at its annual I/O conference. We've been looking at what was unveiled, and musing on how it will affect us all

24 Budget Laptop Bags

If you wanted to, you could spend several hundred pounds on a bag or case for your laptop, but if you don't have that kind of money, then do not despair. There are plenty of decent bags you can get for less than 50 quid – and some of them even have wheels! If you're looking for a convenient way to carry around your notebook PC, then this guide is for you

50 PC Sticks On Test

If you ever needed proof of how far we've come, just consider the PC on a stick. These tiny devices can run a full copy of Windows, despite being not much larger than your average USB pen drive. To help you choose the PC stick that's right for you, we've been looking at six of them, and what they offer

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58 Social Media Buffer Apps



58 Social Media Buffer Apps

Whether we like it or not, social media is a big deal. It's particularly useful for businesses, whether large or small. But if you're busy with other matters, you might struggle to find time to update your Twitter or whatever. Thankfully, there are apps that can help, by letting you write your posts all at once, before publishing them throughout the day. Aaron Birch looks at what's available

62 Things We've Stopped Doing

Remember when you used to defragment your hard drive on a regular basis? Or when you burned all your important files to a CD to keep them safe? So do we, but can you remember when you did it last? Maybe not... because, like a lot of things, it's become largely unnecessary. Join us as we look at more activities we've abandoned



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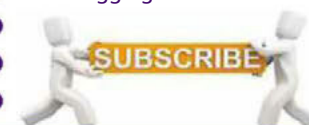
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Has Microsoft Lost Its Way?



Microsoft has been attracting more brickbats and blows than bouquets recently, but what does this mean – and is it justified?

What's the definition of Windows multitasking? Screwing up several things at once! Okay, we're getting our coats... but, as lame a joke as that may be, it isn't just another cheap way of bashing Microsoft and its operating system, which still leads the market. For a good while now, the Redmond giant has been a spinner of plates, a company that has sought to enter various markets and take on all comers and yet, in trying to do everything all at once, it has fallen far short in some areas of where it could actually be.

To some degree, there is a sense of a checklist being ticked off one by one. Compete against Google in the search engine space? Tick. Try to knock iOS and Android off their perch? Tick. Make it big in the virtual reality/augmented reality space? Tick. The list goes on and on, with some successes, some failures – but Microsoft watchers could see it all coming. Three years ago,



Microsoft's then-CEO Steve Ballmer admitted that the company had been focussing too much on Windows and it prompted a sea change in the organisation's thinking.

Ballmer was reflecting on the company's unenviable task of battling against Apple, a company it once thought it had seen off, only to see it come back strong thanks to the iPhone and iOS. Apple was making Ballmer and Microsoft rethink its past and the future. "If there's one thing I regret, there was a period in the early 2000s when we were so focused on what we had to do around Windows that we weren't able to redeploy talent to the new device form factor called the phone," Ballmer told *Business Insider*.

“ Anyone buying an unlocked Lumia 950 XL from the Microsoft Store in the US before 1 May was given a free Lumia 950 ”

That thinking led to a bold decision, and one which annoyed a good number of shareholders: Ballmer looked to reorganise Microsoft so that it would focus on 'devices and services'. It was essentially a message to the world that the firm's traditional business model, which had stood it in good stead for a good 30 years or so, wasn't working any more; that it had to do more than just develop and sell software. Six weeks later, Ballmer announced he was stepping down, but the message was loud and clear. Not only has it been the wheel that has steered the ship since, Satya Nadella has continued in the same direction, to a point at least.

Service, Please

One of the general themes surrounding Windows in recent years has been 'Windows as a Service', in keeping with what was put forward in 2013. It was a confusing and vague term even back then, but it boiled down to Microsoft wanting one operating system for which it could steadily roll out predictable updates, features and functionality and keep everyone at the same level. Underpinning all of this was a burning desire to unite the split Windows user base. Microsoft wanted – and still wants – to put Windows XP, Windows Vista, Windows 7, Windows 8 and Windows 8.1 in a steel coffin and bury them once and for all.

The way it has gone about it has rankled, though. At first, Windows 10 was introduced gently. It was free for anyone with Windows 7 and Windows 8 and 8.1 and there seemed to be



Play On

Microsoft made some mistakes with the launch of the Xbox One. Not only was priced it higher than Sony's PlayStation 4, it was going to require an always-on internet connection and come with Kinect motion sensor as standard. Just as bad, used games were set to be banned from being played on it. As you'd expect, it incurred the wrath of gamers and before long a blog post (news.xbox.com/2013/06/19/update) said an internet connection would not be required and used games would continue to be playable just as they had always been.

In 2014, the Head of Xbox Phil Spencer, admitted Microsoft had made a mistake but with a focus very much on games, he went full steam ahead. Although the console is still said to be lagging behind the PS4 which is outselling Xbox One by as many as two to one, it is still selling 97% better than the Xbox 360 was at the same stage and, by all accounts, it is doing very well, thank you.

A slimmer, less expensive machine is due to be launched very soon together with a couple of Xbox streaming devices and there have been some decent exclusives including *Forza Motorsport 6*, some cool Xbox-first titles such as *Rise Of The Tomb Raider* and an expected forthcoming goody in *Halo Wars 2*. PC gaming is also very buoyant with Windows 10 Games optimised specifically for the operating system and using Xbox accessories. Lots of Xbox games such as *Quantum Break* and *Gears of War Ultimate Edition* are available for Windows 10 computers. It's a winner for Microsoft showing it's nowhere near Game Over yet.



credit Evan-Amos



a choice. You either wanted it or you didn't – it was entirely optional. However, as the weeks and months went by, Microsoft appeared to take some element of choice away. First, it made Windows 10 a Recommended Update, which meant that it would quietly download on to people's systems. If the settings allowed Recommended Updates to be automatically installed, then it would suddenly appear on people's machines: bewildering for a great many and downright annoying for those who realised what was happening.

“ The Windows 10 brand isn't enough for people who use Android or iOS ”

It is a controversy that has not gone away, and it certainly hasn't helped that Microsoft has denied forcing Windows 10 upgrades on people. There is a whole swathe of Windows 10 holdouts crying foul over the heavy-handed nudging it is employing to get the operating system on to as many computers as possible. This, they say, is not a crucial security fix – the reason why they have Recommended Updates set to automatically install. It is, they contend, all a bit underhand and well, not very nice.

To make things worse, there have also been on-screen messages which seem to give no choice. Users were seeing options for “Start download now” and “Start download, upgrade later.” Some were being faced with “Upgrade now” and “Upgrade tonight”. For those who didn't want to do

anything, there was seemingly no option to say, “forget about it, leave me alone, please”. The way to do with was to close the windows. It would come back again and again, though, and it didn't get around the fact that a plain and simple, “no”, didn't seem to be on the cards.

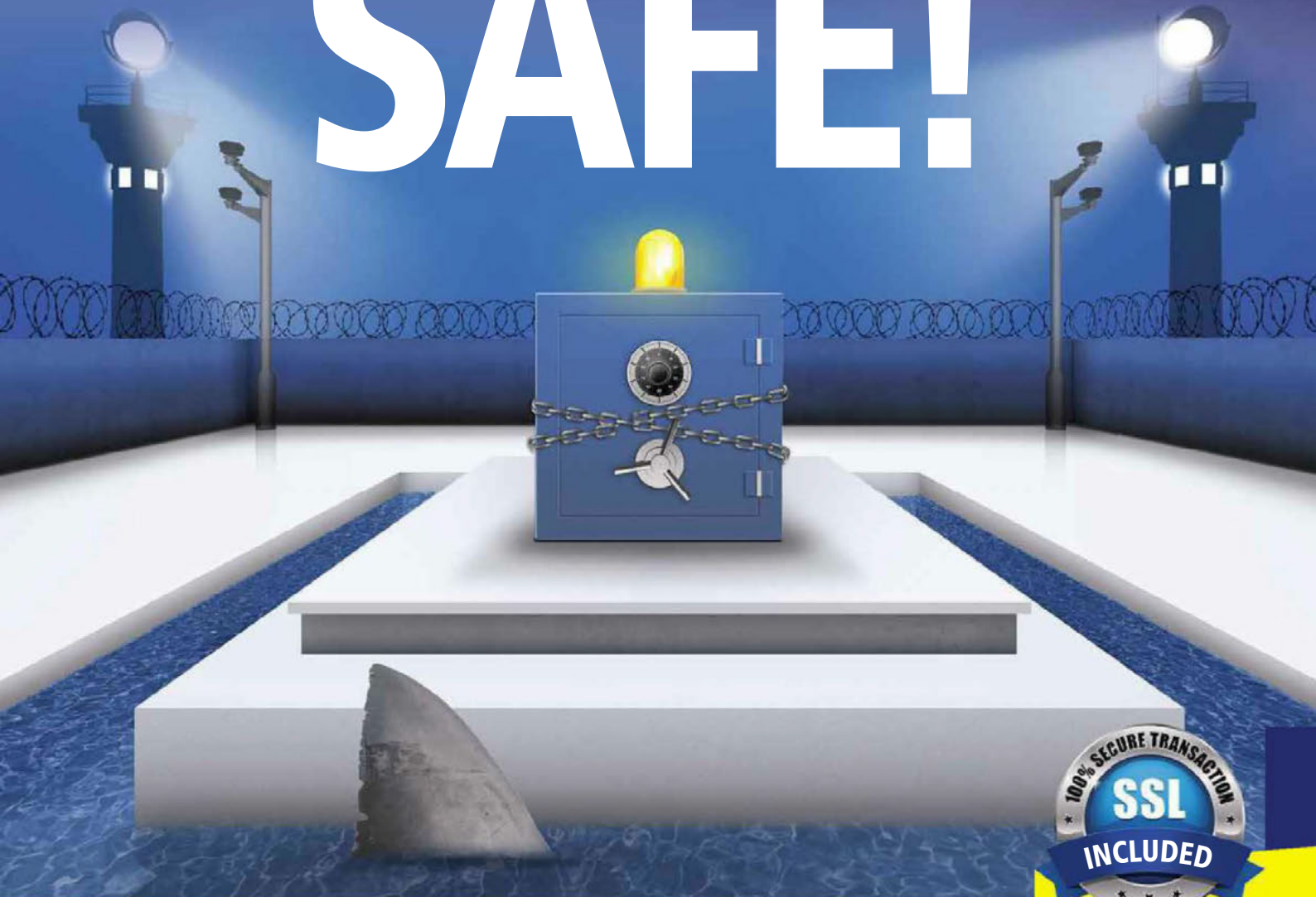
Microsoft did relent and change the way it prompted the ‘recommendation’ for those who hadn't set upgrades to install automatically, but it was accompanied by a small link that needed to be clicked to express the negative. This still didn't dampen down the anger of users, however, and only now is there a chink of light on the horizon for those who just do not want Windows 10. That's only because, as of July 29th, the free upgrade period is coming to an end – and, when that time comes, Microsoft has said that it will turn off the ‘Get Windows 10’ app so the messages prompting an upgrade will finally discontinue.

“Details are still being finalised,” Microsoft told WinBeta, “but on July 29th, the Get Windows 10 app that facilitates the easy upgrade to Windows 10 will be disabled and eventually removed from PCs worldwide. Just as it took time to ramp up and roll out the Get Windows 10 app, it will take time to ramp it down.” After that date, anyone who does want to upgrade will have to pay £100, the same as it currently costs to upgrade from a Windows XP or Vista computer although it will remain free for those who use its ‘assistive tools’.

Which Path?

The grumbles have been seen as an indicator that Microsoft is losing its way. That mere suggestion would dishearten the company, because it was an accusation being levelled at it long before Windows 10 was launched. It shows that, while one problem was solved (Windows 10 being infinitely better than Windows 8 and 8.1), other niggles continue to hold it back. Just as in September 2014, when *Forbes* contributor Adam Hartung was highlighting “the

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week Microsoft lost relevancy” (he brought attention to television announcers referring to Surface tablets as iPads in the wake of a deal between Microsoft and the NFL, which allowed teams to use the devices during games) so today, many are asking, “what now?”

It’s fair to say that things are not as bad as in 2012, when it was *Vanity Fair* questioning the company’s mojo. Back then Windows 8 was still in preview and Windows Phone 7 was suffering poor sales (a demo of its voice-to-text messaging functionality reached embarrassing heights when it just plain failed to work). Journalist Kurt Eichenwald painted a bleak

“**Nadella is a safe pair of hands and one suspects he knows where Microsoft’s strengths and weaknesses lie**”

picture of the company saying Microsoft had suffered “a decade littered with errors, missed opportunities, and the devolution of one of the industry’s innovators into a ‘me too’ purveyor of other people’s consumer products.”

It was hard to argue against that. Windows 8 didn’t help the situation much, either.

Jumping back to 2016: while the share price is now around \$52 (up from \$34.20 when Nadella became CEO two years ago) and while Windows 10 is – in itself – an excellent operating system, people are still seeing fit to pick fault. Then there is still the ‘small’ matter of mobile, a market sector that Microsoft has

barely dented, and shows no sign of working out. Figures suggest that Microsoft still has only 1% of the total mobile space, which is unsurprising given the sheer dominance of iOS and Android. Edging into that party would take something special, and Windows 10 on mobile just isn’t that. Not yet, at any rate.

Phone home

In order to give its mobile division a boost, Microsoft bought Nokia’s mobile device business in September 2013, concluding the deal on April 15th, 2014. By October, it had begun to phase out the Nokia name in favour of its own, its first handset being the Lumia 535 in November 2014, and the latest being the Microsoft Lumia 950 (together with its bigger-screen sibling, the 950 XL).

The 950 – released late last year – was the first phone to have Windows 10 installed on it, and it was a decent enough handset. Microsoft went for a more understated black or white design with the phone, while allowing the backs to be swapped out with more colourful plastic alternatives from other manufacturers. Microsoft also added some nice touches – or non-touches, if you like – such as an iris recognition system to unlock the screen. The 950 included a great 20MP camera, a vastly superior pixels per inch when compared to the iPhone (564 to 326ppi) and even a decent enough battery life. It should have done okay, to be fair.

Fast forward six months from its launch, though, and Microsoft was embarrassingly selling the handset as part of a BOGOF deal. Yes, anyone buying an unlocked Lumia 950 XL from the Microsoft Store in the US before May 1st was given a free Lumia 950 – and with sales of just 2.3 million handsets in the most recent quarter, a drop of some 6.3 million from the same time the year previous, its something of a low point. The smart money was not on the firm’s smartphone, then, but rather on Microsoft deciding enough was enough in terms of making mobile hardware. Late in mid-May the firm sold its feature phone business to a Foxconn

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subsidiary and then, on May 25th, the company announced a further significant “streamlining” of its Nokia-derived Finnish operation, which it’s estimated will involve something like 1,800 job losses. Most reports characterised it as the end of the Nokia hardware experiment, certainly in terms of the consumer market.

Playing Catch-up

In many ways, this goes way back to Ballmer’s observations, showing that Microsoft was indeed playing catch-up on to have found that the competition has driven too far ahead of it, making it hard to make back the lost ground. One of the problems it has in the phone space is that a lot of people are hooked into an ecosystem that they are reluctant to swap for the unknown. The Windows 10 brand isn’t enough for people who use Android or iOS: they are used to having app stores with more than 1.4 million goodies on offer. The Windows 10 store, by comparison, has around than half of that.

So it wouldn’t be a shock if Windows Phone is axed this year. There has been a lot of speculation that Microsoft’s is looking to end its attempts to take on Apple and Samsung – especially given the company is losing close to \$1 billion on the business and is making so many people redundant, the majority of them in Finland, between now and the Summer. If Microsoft does decide to pull out of the phone hardware market, it would be a nail in the philosophy put forward by Ballmer when he tried to move the focus away from software. Buying Nokia was his act and it’s not been one that Nadella has followed with the same kind of devotion. Nadella placed Nokia within the arms of the Windows division last year. The writing has been on the wall for some months.

That’s not to say Windows 10 for mobile will disappear. More likely, development will continue for a while longer and deals will be struck with other manufacturers. “We are focusing our phone efforts where we have differentiation,” Nadella said in a statement. “We will continue to innovate across devices and on our cloud services across all mobile platforms.”

However, all of this comes on the back of \$7.5 billion of writedowns and 7,800 redundancies in the phone division last year. Reducing the nominal value of such an asset to that degree was an admission that the smartphone business was not as healthy as it should have been.

“Upon completion of the annual testing as of May 1, 2015, Phone Hardware goodwill was determined to be impaired,” Microsoft said at the time. “In the second half of fiscal year 2015, Phone Hardware did not meet its sales volume and revenue goals, and the mix of units sold had lower margins than planned. These results, along with changes in the competitive marketplace and an evaluation of business priorities, led to a shift in strategic direction and reduced future revenue and profitability expectations for the business. As a result of these changes in strategy and expectations, we have forecasted reductions in unit volume growth rates and lower future cash flows used to estimate the fair value of the Phone Hardware reporting unit, which resulted in the determination that an impairment adjustment was required.”

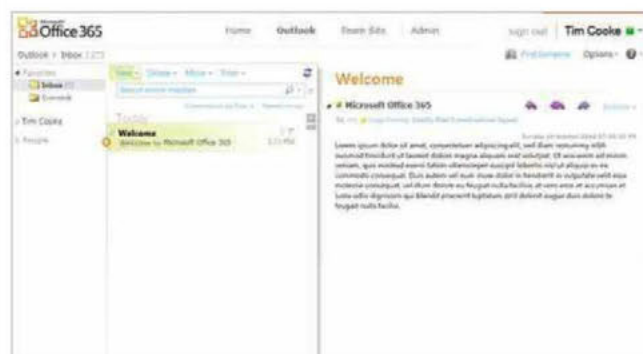
It doesn’t actually help that even Apple is ‘struggling’ in the smartphone market (and we say that with strong inverted commas). In April this year, iPhone sales fell for the first time since the flagship smartphone was launched in 2007, an event

A Thriving Office

The presence of free suites such as OpenOffice and LibreOffice has not dented the success of Microsoft’s Office, which has been high on ubiquitous for since 1988. Available to Windows, OS X, mobiles and tablets, it’s now up to Office 2016 and allows for the creation, opening, editing and saving of files in the cloud straight from the desktop.

Office Online has been a hit. It allows for close collaboration on documents and the ability to hold Skype-enabled chats. Office has very much moved with the times and it looks set to continue doing so. There are so many users who are *au fait* with its inner workings that many companies would not contemplate changing over. That’s not to say they would rule it out forever, though. The UK government has long been moving away from Microsoft towards the Open Document Format as a cost-saving measure.

Microsoft hasn’t taken such threats to Office lying down, however. For example, It put out a press release in August last year saying Office 365 was 80% cheaper compared to OpenOffice. To back up the claim, it cited the example of the City Council of Pesaro in Italy, which had spent €300,000 on installing OpenOffice only to have issues with document formatting.



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that only goes to show the battle Microsoft faces. In a world where iOS is perhaps not the force that it once was (in the first quarter of the year iPhone sales were 16% down on the previous year and a worrying 32% down on the last quarter of 2015), there is even less chance of Microsoft shaking things up with Windows Phone. Even worse, Apple's 51 million sold units dwarfs the Lumia's revenue into insignificance.

Just as worrying for Microsoft is Apple's continuing growth in the desktop and laptop markets. Apple's shipments are rising in a PC market that is otherwise declining. From the fourth quarter of 2014 to the fourth quarter of 2015, Apple grew by 2.8% while Acer dropped by 11.2% and HP fell by 8.1%. It would be silly to say Windows is threatened by this – just walk into a few offices, hospitals, universities or manufacturers and see how many Apple Macs you spot compared to Windows PCs and you'll see what we mean – but even if Apple's share is 4.5% overall, Microsoft can still be forgiven for being a bit envious.

Time To Experiment?

So where does this leave Microsoft? For the next few years, it's unlikely to be too worried. There are many positives such as the fact that Bing is starting to eat away at Google's market share and open up a revenue source. Windows 10 is also ending up on millions of computers and it could well achieve Microsoft's desire of a billion installs by next year. The problem with gripes is that they eventually become something rooted in the past. Give it a year or so and most people will have likely forgotten how Windows 10 came to be on their machine and they'll just be enjoying it instead.

From that point on, it's anyone's guess. Nadella is a safe pair of hands and one suspects he knows where Microsoft's strengths and weaknesses lie. The market is changing, though, with social media companies such as Facebook having a greater say in the future of technology. In a lot of ways, it's a time for experiments. Microsoft is continuing to do well in the field of artificial intelligence (even if it had to delete its Tay chatbot because it was hijacked into loving Adolf Hitler and spouting some pretty disturbing tweets). It is also turning heads with its Surface tablets at last (with some suggesting that it may have one last plunge into the phone pool with a Surface handset).

Then there's HoloLens: the big one, an intriguing move away from the VR tech that's everywhere right now, and a glimpse at what augmented reality could bring us. The first major update for the development edition has just been released and it can now run multiple apps and make use of new voice commands. It's multi-tasking and it's working by all accounts. NASA has collaborated with Microsoft to recreate the experience of walking on Mars and it is being geared up for use in the military. It shows Microsoft can be a hit in hardware if it gets in there early enough. With HoloLens, it is leading the field and taking strides to victory. It could so easily be its big triumph.

That's only one path, though, and Microsoft is treading many. While it is currently being bolstered by increased revenue (\$98.58 bn) and assets totalling \$176.22bn, if Microsoft isn't going to truly get lost, it needs to get back some of the focus that it once felt did it no favours. It's all well and good having fingers in lots of pies, but when there are too many holes it can start to look sloppy. So, while it's too early to say if Microsoft is in trouble – it is 41 years old and weathered so many storms that it should sail through – it is also now very much aware of the consequences of missing the boat. **mm**

Venturing Forth

Microsoft is making a renewed push in funding start-ups with the newly unveiled Microsoft Ventures. As well as looking to make investments in companies it is curious about helping develop, the move will also help to build its ecosystem. With the right choices, it should be able to expand its horizons and keep its finger on the pulse.

Nagraj Kashyap, corporate vice president of Microsoft Ventures, said: "In Microsoft's history of engaging with and supporting start-ups, we've done a lot of investing, but not a lot of early stage. Because we would often invest alongside commercial deals, we were not a part of the early industry conversations on disruptive technology trends. With a formalized venture fund, Microsoft now has a seat at the table."



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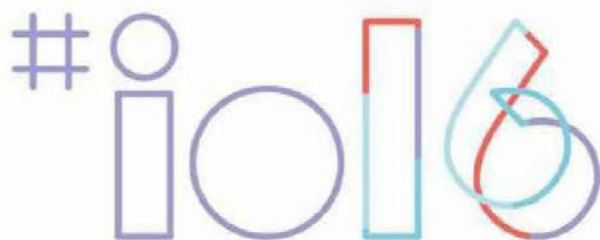
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Google I/O 2016

David Briddock examines all the big announcements at Google's latest developer conference



Google I/O is all about motivating and encouraging the development community to build software for Google's projects and products.

Apart from the keynote address anyone who attends all three days can choose from scores of in-depth sessions. This year, in a break from tradition, it was held at the open air Shoreline Amphitheatre venue in Mountain View California. A move, in part, designed to accommodate a larger developer audience, while also giving the event a new feel.

Positivity

As usual this Google I/O conference focused on the positive and was full of upbeat messages. There are lots of reasons to be positive, too: for a start, Android is now the dominant mobile operating system, relegating Apple's iOS to the number two slot, and the Microsoft/Nokia smartphone challenge is as good as dead.

Chrome-based products are another a good news story. Despite being late to the party, the Chrome Browser also sits at the top of the charts and now boasts over one billion mobile users. The Chromebook bandwagon is rolling along nicely too, recently outselling the Apple Mac range in the US. What's more, the low-cost ChromeCast video and audio dongles are still a popular purchase.

Last Year

Google I/O 2016 had a very different agenda to last year. In 2015, Android content was still in evidence – specifically, the new features of Marshmallow – but the 2015 keynote was packed full of new technology announcements. Developers were entranced by Project Soli, which captured tiny finger movements and full hand gestures in three dimensions. Another crowd pleaser was Project Jacquard, which

puts a gesture interface right into the very fabric of garments. Project Ara, the eagerly anticipated modular smartphone, seemed to be a little closer and some new hardware appeared for Project Tango and its 3D environment mapping capabilities.

None of these projects were mentioned in this year's keynote, though. They are still ongoing, and some popped up in those in-depth sessions, but this year the focus was on core Google projects.

Conversational Push

Early on in the keynote Google CEO Sundar Pichai revealed that voice queries already account for 20% of all mobile queries in the US. He went on to explain that Google intends to build on this momentum with a new breed of conversational user interfaces (CUI) powered by its machine learning technology. He also stressed that natural language translation is advancing quickly



▲ Google I/O 2016 stage



▲ Google Home

and that, by training its learning algorithms to deal with background noises, Google had improved voice translation accuracy by 25%.

Google's AI capabilities have been ably demonstrated by the recent Go board game challenge win, and its autonomous vehicle project. However, its TensorFlow software – which powers natural language processing and AI – requires a lot of processing power. On stage Pichai revealed Google has built its own Tensor Processor Unit (TPU) chips that significantly enhance

conditions, book events, order taxis, make dinner reservations, buy goods and more.

Google Assistant is an attempt to make voice interaction the preferred choice for mobile device owners. Apple's Siri, Microsoft's Cortana and other mobile platform players must now rise to the conversational challenge or risk domination by Google apps and services.

In its next announcement Google took aim at Amazon's Echo voice interface product (goo.gl/rs6ijL). Google Home, due

stickers, but there's also an innovative text scaling feature to indicate a 'shout' or 'whisper' plus an Inking mode for photo and image annotation. There is also an Incognito mode that delivers end-to-end encryption, discreet notifications and user-defined message expiration, but – unlike WhatsApp and some other – this level of privacy does not come as standard.

That's because, behind the scenes, Allo backed by a suite of AI software that needs to know what you're chatting about. Software that can offer appropriate 'Smart Reply' suggestions, or act as a front-end to Google Assistant. Features that put it in competition with the new Facebook Messenger.

Complementing Allo is Duo, a one-to-one video calling app. Duo's advanced engineering should make video calling a more secure and more reliable experience, even on slower networks. While the clever 'Knock Knock' feature offers a live video preview of the caller, before you've accepted the call.

Allo and Duo will officially launch in summer 2016 and target both Android and Apple iOS devices.

“ Instant Apps redefine what's meant by a smartphone app ”

AI processing power in its massive data centres (see boxout).

Backed by all this advanced technology, plus a mammoth collection of personalised data, Pichai announced two new conversational user interface products called Google Assistant and Google Home.

Assistant And Home

Google Assistant is a voice-powered, AI-enhanced app for mobile phones. In scope it goes far beyond the simple queries and Wikipedia-like answers currently offered by Google Now, Siri and the like. Here the goal is to enable smart conversations and deliver human-like intelligence.

The real benefits come from task based interactions. Here Google Assistant uses a collection of cloud-hosted AI 'Bot' services to send text messages and emails, check traffic

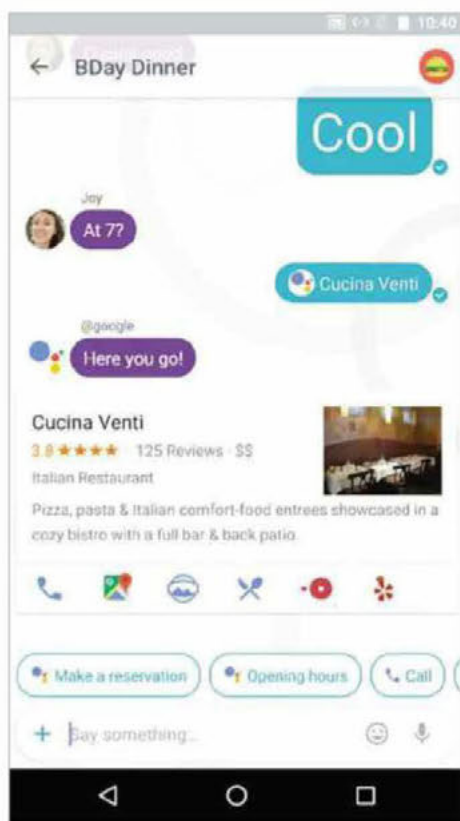
to appear later in 2016, is a sleek colour-coordinated piece of smart-home hardware. Unsurprisingly, it's designed to make the most of Google's voice-powered technology. Apart from acting as a conversational hub Google Home can communicate with the Nest Learning Thermostat (nest.com) and other home automation devices or act as a wi-fi speaker for music, podcasts, news and so on. Once again Amazon, Apple and smart home players must respond quickly to avoid their offerings appearing outdated.

Allo And Duo

Next up on the keynote agenda were Allo and Duo, two brand new social communication smartphone apps. Allo is Google's latest attempt at a messaging app; the core functionality revolves around chat, along with new emojis and

Key Announcements

Google Assistant
Google Home
Allo app
Duo app
Android N
Android Instant Apps
Android VR Mode
Daydream
Android Wear 2.0
Android Auto update



▲ Allo messaging app

Android Momentum

These days we've come to expect a new alphabetically-named Android operating system release every twelve months. Last year at I/O it was Marshmallow so this year it's the turn of 'N'.

Since it was introduced 10 years ago Android has become the dominant mobile operating system. That's thanks to manufacturers around the world building more and more Android devices. In fact Pichai said that there'd already been over 600 new Android device launches in 2016.

It's not all good news, though. Typically only a limited number of new Android handsets install the most recent operating system. This means Marshmallow installations account for well under 10% of the total number of active Android handsets. Of course, this isn't what developers want to hear. They want to write code that utilises the latest features and functionality. What they're after is a bigger incentive for manufacturers to install Android 'N'. Google hopes to do just this with a raft of Android improvements a major push into the VR marketplace.

Let's look at what's new in Android 'N' first, then.

Android N

Android N users will benefit from a number of new features when it finally

CUI

Conversational User Interfaces, or CUIs, are the next step in voice interface evolution. Appearing first on our mobile devices and within the home they offer the prospect of smart conversations. Which means we'll spend much less time gazing at our screens.

CUI aim to be more precise, more intelligent and far more personal by utilising natural language recognition to piece together spoken phrases into meaningful data. It won't just recognise the words we say, but will understand the context and intent behind our words.

Behind the scenes there'll be an army of cloud-hosted AI Bots, smart services that transform our spoken questions and requests into actions. Actions that embrace social communication, scheduling and reminders, booking and reservations, local weather and traffic reports, instant purchasing and much more.



Daydream

For the last few years VR at Google was synonymous with the cheap-as-chips Cardboard headset (goo.gl/Rfaj6N). During this period over five million have been shipped and developers have put thousands of Cardboard apps into the Play Store.

Cardboard will still be around, but to compete with likes of Oculus Rift and Samsung Gear VR Google announced a new, higher quality VR platform called Daydream. So what is it?

At this point Daydream consists of three things: design specifications for a headset viewer and Wiimote-like controller, a set of high-end VR-ready smartphone specifications and a new VR mode that's built right into Android N. Smartphone manufacturers were given the new hardware specs some time ago and will be including a powerful graphics processor (GPU) to make full use of the Vulkan graphics engine. The target they've been set is to reduce image latency down to less than 20 milliseconds. Meanwhile Google and its partners are already building Daydream-spec viewers and controllers.



▲ Daydream

appears later in the year. One key change is that software updates now happen seamlessly in the background. This replicates what happens with the Chrome browser, Chromebooks and other Chrome OS devices. Auto updates improve security, which has itself been strengthened with measures like file-level encryption and updates to the Android Safety Net app verifier.

Android N needs less storage capacity, we're told, and should run down the battery more slowly than its predecessors. Multi-tasking support is also being improved through a new split screen mode for mobiles, plus a TV-centric picture-in-picture capability. Notification management has also been simplified.

Performance was another priority for N. The new runtime is said to be between 30% and 60% faster, and Google say its new Just-In-Time (JIT) compiler is 75% faster. What's more, to improve graphical performance Google has its Vulkan engine, a low-overhead cross-platform API for high-performance 3D graphics.

Surprisingly, there's no official name for 'N' as yet. While all previous versions have, of course, been named after sweets and puddings, this time around Google wants members of the public to make suggestions (add yours at android.com/n). So, during the Beta phase the 'N' moniker will be retained.

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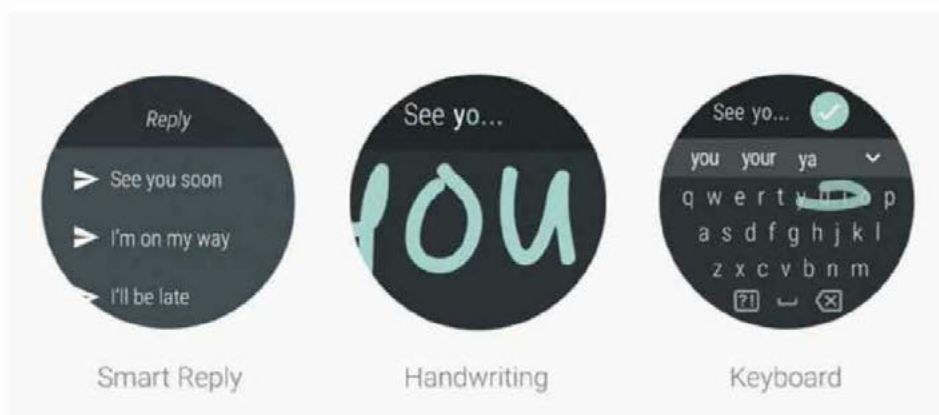


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▲ **Android Wear 2.0 input options**

As for apps, the stage presentation mentioned VR-enabled version of Google apps like YouTube, Street View, Play Movies, Google Photos and the Play Store. Third party developers are already working with prototype hardware, so there'll be a sizeable collection of apps in the Play Store when Daydream hardware hits the shops, probably in the last quarter of this year.

Android Instant Apps

In addition to the VR push, Android developers had another reason to cheer when they heard the Instant Apps announcement. Put simply: Instant Apps redefine what's meant by a smartphone app and, at a stroke, neatly sidesteps the frustrations developers encounter when trying to construct apps that run smoothly and bug-free on a cross-section of Android OS versions.

To understand how it works a little better, let's consider the web app experience. When using such apps – like, say, Gmail or Google Docs – we just click or tap an app link and it starts running. We don't have to install something first – and we'll always be running the most up to date version of the app.

Well, Instant Apps applies this scenario to native smartphone apps. Tap a link and few seconds later the latest version of the app is running on your Android smartphone. This is possible because the app is dynamically loaded from the cloud in a module-by-module fashion.

Developers will have to make some changes to their app code it would seem, but once that's done their Instant App will work on a wide range Android versions, from the JellyBean (4.1) right up to Android N. These apps will even support Android Pay, and offer an option to download and install a full version with a double tap action.

Android Everywhere

Of course, Android isn't just limited to smartphones and tablets. There's Android Wear for your wrist, Android TV for your home and Android Auto for your car. Smartwatch developers can play around with Android Wear 2.0. This major update has a much cleaner look, extra navigation gestures and watch face embedded widgets. Messaging now offers smart replies, better handwriting recognition and a new keyboard. Plus you can now download apps direct from the Play Store to your wrist.

Another key feature is standalone apps, which work without smartphone support. These apps can, say, start tracking your run, cycle ride or gym session immediately without the need to communicate with a smartphone. So look out for a new range of Wear 2.0 smartwatches and fitness gadgets later this year.

As for Google Auto, its three most requested features are coming: 'OK Google' voice interface, Waze – a real-time animated traffic feedback app (waze.com) – integration and seamless wireless networking, which means you can interact with your smartphone while it's still in your pocket.

Even better, you won't actually need an Android Auto equipped car. Instead the Android Auto experience can be replicated by an app running on an in-car console-docked Android handset. This includes turn-by-turn navigation, maps, messaging with auto-reply, voice commands and so on.

Summing Up

I/O remains the premier Google developer conference, but this year it was also an opportunity to launch a multi-pronged attack on its rivals. Siri and Cortana suddenly look rather limited, Amazon's Echo now has a strong competitor, Daydream will turn quite a few heads and Android Wear 2.0 erodes Apple Watch's value-for-money proposition still further. However, the majority of announcements won't see the light of day until later this year. So rivals have a six month time period to respond if they can.

Will Google Home be a success? Would you find the Allo app useful? Does the Daydream VR initiative sound exciting? Would you buy an Android Wear 2.0 watch? We'd love to know so write to us at letters@micromart.com. [mm](#)

Tensor Processing Unit

All this conversational technology, natural language translation and smart intelligence required huge amounts of processing power. In fact, it's led Google to design its own Tensor Processing Unit, or TPU.

Built around an application-specific integrated circuit, or ASIC, these TPUs optimise the performance of its TensorFlow neural-net-based machine learning software. Google uses neural nets to map the web, identify objects and faces in photos, translate languages, identify spoken commands plus a whole host of other pattern recognition scenarios.

A TPU board fits into the same sized slot as a hard drive and have been installed in certain data centres for about a year. Google says these TPUs provide, "an order of magnitude better-optimized performance per watt for machine learning" than other hardware solutions.

Of course, news of this chip making venture is bound to concern other chip manufacturers like Intel and Nvidia.

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There's no doubt we live in a world of smartphones and tablets, but there are still plenty of reasons to buy a laptop for your mobile computing needs. Whether you want to write a few letters, create some PowerPoint presentations or just make things blow up in the latest videogames, you're better off doing it with a full-size keyboard and a decent-sized screen. And you'll also find it easier to play non-standard media files that aren't necessarily supported by operating systems like iOS and Android.

If you do buy a laptop, though, then you'll need a way to carry it around, not only to make it less cumbersome, but also to protect it from accidental damage.

And as well keeping your machine safe, laptop bags and cases straddle an area that covers both functionality and fashion. On one hand, they need to do the job of protecting your laptop, but on the other hand, you might also want one that looks good when you're carrying it. As you might well expect, designer laptop bags are



▲ *Essentials P15LS11 15.6" laptop sleeve*



▲ *iCozzier Diamond Foam neoprene sleeve*



▲ *Falcon International 16" laptop sleeve*



▲ *Falcon 17" ABS laptop attache case*

going to cost more than basic ones, but you also might pay more for other features, including locks and solar panels for charging your laptop's battery.

That's all well and good, but you might not have huge amounts of cash to spend on a bag, especially if you've just spent a bucketload on a new laptop. Thankfully, you don't need to spend a lot to get a decent case or bag, as we're going to show you here. First, let's kick things off by looking at the most basic level of protection: laptop sleeves.

Sleeves

Right now, you can walk into your local Currys and buy an Essentials P15LS11 15.6" laptop sleeve for just £4.99 (goo.gl/AUzEjz). We wouldn't particularly recommend you do, though, unless your laptop never leaves your house, and you just want a way to carry it from one room to another – in which case, we'd suggest simply using your hands.

Yes, it's an extremely basic sleeve, consisting of little more than a black bag with a couple of handles. In fact, its most exciting feature is the inclusion of 'dual zips'. Unfortunately, it just lacks enough padding to make it worth buying.

Head on to Amazon.co.uk, though, and you can find the iCozzier' 13.3-14" Diamond Foam splash and shock resistant neoprene sleeve (goo.gl/SibCCU) for £11.99. This offers much more padding than the Currys sleeve, but it's missing any kind of handles, so you'll have to carry your computer under your arms or in a separate bag. Of course, at a maximum of 14 inches, your laptop is probably fairly light anyway, so a sleeve like this might actually do the job.



▲ *Targus laptop carry case*

If you do need handles, then check out the Falcon International 16" laptop sleeve, which comes in at a piddly £9.77 from the Post Office shop (goo.gl/fFGG17). Much like other laptop sleeves, it's basically a big zip-up wallet with some padding inside, but unlike a lot of other sleeves, this comes not only with handles, but also a removable shoulder strap, so it's close to being a full-blown carry case. Plus it comes with a "detachable utility pouch", which is apparently for you to store your stationery in. Personally, we'd call that a pencil case, but there you go.

Soft Cases

With a proper full-size soft case, you can carry your laptop around in style, while also giving it enough protection to survive knocks and bumps and even the occasional fall. And although prices can be high for such products, you can also get something perfectly serviceable for less than £20.

Feel The Power

One of the biggest problems with laptops is keeping their batteries topped up. Their large screens require a good deal of power to run, and firing up a game will drain your battery in no time at all.

If you can't find a plug socket, then you could carry a spare battery. Or you could let your laptop bag lend a hand, provided you buy one that has a battery pack built into it.

The Ampl Smart Backpack would be perfect for this, but currently this IndieGoGo-funded bag isn't widely available, but you can go to ampl-labs.com to reserve one. There are a few different packages available, but to get one that will charge a laptop and not just phones and tablets, you'll need to spend at least US\$429. This will get you the bag itself, a 15,000mAh battery and a smaller 6,000mAh one. Spend \$499 and you get an AC inverter too.

Not only will this set allow you to keep your laptop and mobile devices charged, but you can control the charging with a mobile app.

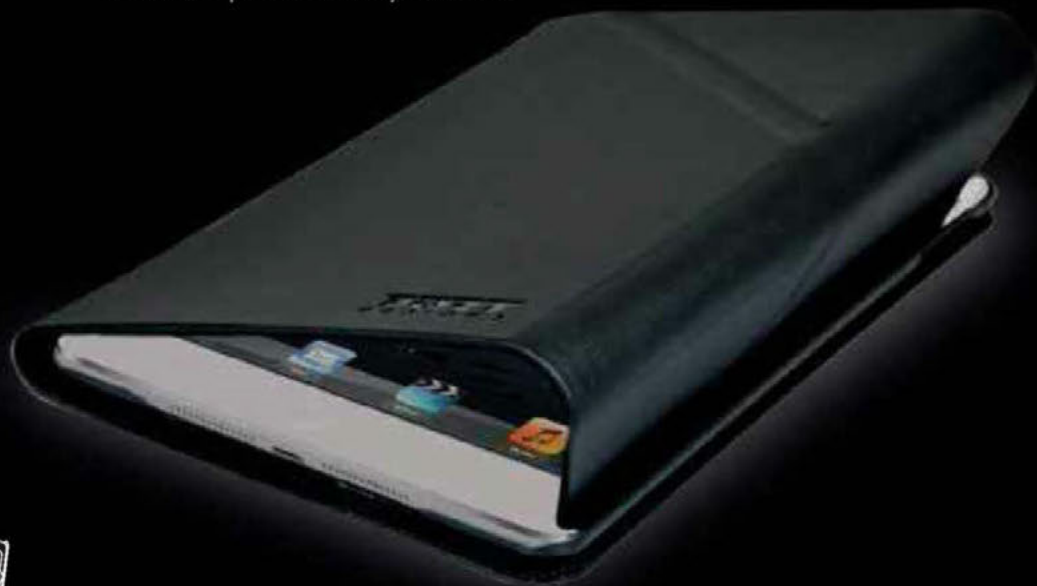
Of course, you'll need to remember to charge Ampl's battery packs, so that will again mean finding a plug socket every now and then.

Another option would be to buy a bag with a solar panel, like those made by Voltaic (www.voltaicsystems.com). Obviously, though, we live in the UK, where the sun only really puts its hat on for about three weeks of every year, which would explain why Voltaic's products are really widely available in this country. Still, if you're going somewhere sunny for a while, then it might be worth seeking out one of these bags for your travels.

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TECHNICAL SPECIFICATIONS

PRODUCT NAME	Muskoka iPad Air 3
REF - EAN	201387 - 3567042013872
PRODUCT OUTSIDE SIZE	245 x 180 x 12 mm
PRODUCT WEIGHT	298 gr
PACKED OUTSIDE SIZE	270 x 185 x 18 mm
PACKED WEIGHT	344 gr
MATERIALS	Polyurethane / ABS
PCB	5
COUNTRY OF ORIGIN	China
WARRANTY	Limited Lifetime Warranty

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▲ AmazonBasics rolling laptop case



▲ Acqua Di Parma messenger bag



▲ Aluminium laptop and test equipment flight case



▲ Port Design Liberty notebook case with bundled mouse

For example, for just £15.54 from Ebuyer (goo.gl/izYg74), you could get yourself a basic Targus laptop carry case, which will fit systems up to 16 inches in size. Obviously, this isn't going to match up to more expensive bags, including Targus's own higher-end products, but you get a lot for your money anyway. As well as a bunch of pockets for pens, phones and so on, it has a cushioned section for the laptop, which will provide more protection than a simple sleeve. And it has a strap inside, so you can secure your computer in place.

Also worth a look is the Port Design Liberty notebook case, which costs just £15.08 from Kikatek (goo.gl/Oiumik) with free postage. As well as a decent bag that can house laptops up to 15.6 inches in size, it also comes with a free Polaris 800dpi optical mouse.

Increase your budget slightly, and you could pick up the AmazonBasics rolling laptop case for £33.99 (goo.gl/s4Iy53), which has the added benefit of wheels and an extendable handle, so you can pull your laptop around behind you like a suitcase, instead of putting all the weight on your shoulder. It takes systems up to 17 inches in size, which can be fairly hefty, so if you travel a lot, such a case could be a godsend.

Of course, you could spend a lot more on a soft case. There are plenty around that cost more than a hundred quid, but we wouldn't recommend spending any more than £50 or £60 unless you want something with special features or a design you particularly like.

If you really wanted to, you could buy an Acqua Di Parma messenger bag from Harrods and stick your laptop (which is probably a MacBook) into that. It'll set you back £1,299 (goo.gl/g6rWt9), though, so if you happen to possess more sense than money, then we'd suggest you look elsewhere.

Ultimately, whether you spend 15 quid or 50, you should be able to find something that's up to the job of keeping your PC safe.

Hard Cases

Offering an extra layer of protection, hard cases have a couple of distinct disadvantages. Not only are they bulky and inflexible, but they're naturally heavier than soft cases too. If that's not a problem for you, then there are plenty of great cases, most of which are either made from plastic or a lightweight metal like aluminium.

Prices vary, of course, and hard cases can be expensive, but if you look around there are some cheaper items to be had, such as the Aluminium Laptop and Test Equipment Flight Case from cases-and-enclosures.co.uk, which costs just £26.44 (goo.gl/PypsBr). It's not clear from this website what size laptops this case will accommodate, but this seller is a British firm, based in Hertfordshire, so it would be worth getting in touch to get more details.

Up your budget, and you can start shopping for cases with combination locks on them. For example, for £42.99 you could get either the Alumaxx Kronos laptop attache case from Paperstone

(goo.gl/4NOANs) or the Falcon 17" ABS laptop attache case from BagsDirect.com (goo.gl/D45ZUX).

The Kronos is an aluminium case, with two combination locks, a padded area for your laptop and a selection of compartments and holders inside. Paperstone doesn't give a laptop specification in inches, but it does list the size of the compartment as 42cm (W) x 30cm (D) x 7cm, so to be safe, we'd say 15 inches.

If you'd rather not have something so shiny and metallic, then the Falcon's sleek black design will no doubt be more appealing. Made from hard-wearing ABS plastic, it comes with all the pockets and compartments you might need for stationery and so on. It only appears to have one combination lock, but one advantage it has is a weight of 1.8kg, which is significantly lighter than the 2.4kg Kronos.

Rucksacks

From personal experience, we know the pain of carrying around a laptop in a satchel-style case. Once you've packed in the computer itself, the charger, accessories and other bits like your smartphone and stationery, it can put a huge strain on your shoulder if you're using a shoulder strap. And if you carry it by the shorter handles, your arm will quickly feel like it's going to drop off.

Absolutely Fabulous Bags

For the most part, cheaper laptop bags and cases aren't hugely good looking. You can pay for designer products, but they're expensive, of course. Thankfully, leather or leather-effect bags like the Snugg Crossbody Shoulder messenger bag (£49.99, Amazon – goo.gl/Djw326) can offer a good dose of physical beauty without breaking the bank.

And if that's still just too mainstream and generic for you, then head onto sites like Etsy.com, NotOnTheHighStreet.com and Folksy.com for even trendier-looking items.

They won't necessarily offer the same kind of protection as other laptop bags, but they do look good, without screaming 'Look at me. I'm carrying a laptop', which could be a security risk in itself.

➤ Snugg Crossbody Shoulder messenger bag





▲ Briggs & Riley 15.6 laptop and iPad backpack



▲ Targus Classic laptop computer backpack



▲ Wenger SwissGear Mythos 15.6" laptop bag



▲ Targus Drifter North Sport backpack

This is where a decent rucksack can be a major asset, and there are now loads of them that are specially designed to carry a notebook computer.

As ever, prices range from the cheap to the ridiculous. The Briggs & Riley 15.6" Laptop and iPad Backpack, for example, costs £219 from John Lewis (goo.gl/0ZqRHk), and it comes with a lifetime guarantee, but you don't need to spend anywhere near that much to get something that will do the job and last a long time.

For just £21.98, you can get a Targus Classic Laptop Computer Backpack from Misco (goo.gl/BJe9gW), which will take laptops up to 15.6 inches in size. As well as providing plenty of pockets for all your accessories, your actual laptop has its own section at the back, where it's provided with plenty of protection.

At such a low price, though, certain corners are likely to be cut, and this case, you're probably looking at lower-quality materials, weaker stitching and fewer luxuries. It's also not waterproof, like other bags. Targus does make higher-quality bags, of course, but you do need to accept this is a budget product and that it won't match up to those.

Again, though, you don't need to spend a lot more to get something of much higher quality. The Wenger SwissGear Mythos 15.6" laptop bag, for instance, is currently on offer at CCOOnline for just £34.98 (goo.gl/FShTo0), which is fantastic, because it normally costs around £40. User reviews suggest that not only is it well made

and robust, its waterproofing is good enough to cope with the Great British weather.

However, it's not specifically designed to be water resistant – not like the Targus Drifter North Sport Backpack (£46.66, Amazon – goo.gl/HM0ooC), which comes with its own rain cover. It'll only accommodate a laptop up to 14 inches, but assuming that's okay for you, you get a well-made bag that will keep your computer safe in a downpour. Plus it has a secret compartment for you to store your valuables.

Summary

Of course, there are hundreds of different bags and cases we could have chosen to include in this article. Companies like Wenger, Samsonite and Targus create some excellent budget products, but equally, you can find worthwhile entries from AmazonBasics and lesser-known brands too.

You can potentially pay hundreds of pounds for a case or a bag for your laptop, and if you can afford to do so, then you'll no doubt be rewarded with high-quality materials and extra features, but what we've tried to show with this small selection is that you can also get what you need for less than £50.

The best thing to do, of course, is to try out these things before purchasing, because as well as features like pockets and laptop space, you also need to consider comfort and things like waterproofing.

Of course, these kind of qualities may be more difficult to assess just from product descriptions and reviews. Popping into a local shop is one solution, but it's also worth bearing in mind that anything you buy online is covered by a 14-day cooling off period, so you can send things back easily enough if they don't meet your requirements. Just be aware of any return postage you might have to pay if you take this route. [mm](#)



▲ Alumaxx Kronos laptop attache case

Links

When looking for a laptop bag or case, these companies are likely pop up. To see more of their ranges, head to their official websites:

- **Targus:** www.targus.com/uk/laptop-bags-cases
- **Samsonite:** www.samsonite.co.uk/laptop-bags
- **Wenger:** int.wenger.ch/en/gear
- **Falcon Bags:** www.falconbags.co.uk
- **Port Designs:** www.portdesigns.com

Remembering... Horace

We recall a strange blue character this week

There are numerous famous characters in gaming that are recognisable no matter where you travel in the world – with the exception of some of the more far-flung destinations, of course.

Lara Croft, Mario, Sonic the Hedgehog, Q-Bert and countless others have left their mark on society. For those of us of a certain age though, there's also Horace. That strange-looking blue creature, with haunting large eyes, lack of facial features and hand-less arms that seemingly grow from the top of his/her/it's head.

Although Horace only starred in a trio of games he soon became the icon for the Spectrum, mostly due to the fact that Sinclair Research was one of the publishers. Despite his perpetually gloomy visage, Horace managed to dip his pointed and oddly shaped toes in a number of cloned games.

Hungry Horace, the first of the series, was simply a *Pac-Man* clone. *Horace Goes Skiing* was a mixture of *Frogger* and *Slalom*. The third title, *Horace and the Spiders*, featured stages in the same vein as *Pitfall* and *Space Panic*.

Its History

Horace was developed by William Tang, a chap who also programmed *Asterix and the Magic Cauldron*, *H.U.R.G.*, *Way of the Exploding Fist* and *Mugsy's Revenge*.

The first *Horace* appeared in the 1982 and was released by Sinclair Research Ltd. At the

time, it was fairly well received, although it didn't quite have the quality of some of the Spectrum games that were released months later. It did offer something a little different to the average *Pac-Man* look-alike, with the C64 version even having a level editor for gamers to share.

The relative success of *Hungry Horace*, in that it didn't cost much to create and it yielded a healthy return, led to the most popular of the titles, *Horace Goes Skiing*. Here *Horace* took a, for the time, quantum leap from being a mere *Pac-Man* clone to something else entirely.

Skiing was a fun game to play. The first section, where for some unknown reason the place to hire the skis lies on the other side of an extremely busy dual carriage way, was certainly challenging. It was less a game of *Frogger* timing and one where you hoped and prayed for a slight gap in the traffic before launching yourself at full pelt across the bitumen.

Any collision resulted in you losing £10 and being picked up in an ambulance. And should you run out of money, then you couldn't hire the skis to the slalom section, and it was game over. Ironically, you were still charged £10 if you were hit by the ambulance.

Finally, we had *Horace and the Spiders*, a game of much running, swinging from spider webs and jumping on spiders while they fixed their webs in order to kill them. Why? Absolutely no idea.

Did You Know?

- There was a poke that removed all the traffic off the road in *Horace Goes Skiing*.
- *Horace in the Mystic Woods* was developed in 1995 for the Psion 3, but not by William Tang.
- Horace made an appearance in the PS2 game *Dog's Life*.
- William Tang also wrote *Spectrum Machine Language for the Absolute Beginner* – a ZX Spectrum user's bible.

William Tang was set to work on another *Horace* game, but the internet tells us that he suffered a collapsed lung and therefore retired from gaming. Not much else is known about Mr Tang these days, but wherever he is, we hope he's in good health.

The Good

Fun games, quite challenging and an endearingly odd main character.

The Bad

Nearly £6 for each game, which was a fortune to a ten-year-old! They weren't exactly ground-breaking titles.

Conclusion

Horace, whatever the heck you are, thanks for some odd, but rather pleasant memories. **mm**



▲ What the devil are you supposed to be, Horace?



▲ The only road in the world where the traffic swerves to try to hit you



▲ Pac-Man versus Horace? I'd put my money on Horace

Alphabet Pi: N

David Briddock meanders through Raspberry Pi technology from A to Z

THIS WEEK: NOOBS, Nano and Networking

NOOBS

To work, a Raspberry Pi needs an operating system distribution image. This image has to be installed on the SD memory card. For Linux newbies this can seem rather a daunting process, so the Raspberry Pi Foundation created NOOBS (New Out Of the Box Software) to transform operating system installation into a three simple steps.

The first step is to download the NOOBS zip file and unpack it onto a blank SD card using any PC. Next, slot this SD card into your Pi's SD card slot and boot the Pi. You'll see an operating system menu with options such as Raspbian, ArchLinux, OpenELEC, Pidora, RaspBMC and RiscOS.

“ Nano is accessible from the desktop menu or from the command line in a terminal window ”

Now you just select the OS you want. On selection, the SD card is automatically partitioned, and the OS image installed. You can access the NOOBS menu at any time by holding the 'shift' key while booting your Pi, so it's easy to reinstall the OS or replace it with a different one. To find out more visit the Pi website (raspberrypi.org/blog/introducing-noobs).

These days there are two versions of NOOBS. The full version also comes pre-loaded with the Raspbian image; in other words it's all you need to get started with your Pi. However, it is a very large download, so now there's NOOBS Lite, which just contains the three-step installation software. Use this version if you already have a Raspbian image or wish to install one of the other supported operating systems.

The easiest solution of all is to buy an SD card that's already preinstalled with the full version of NOOBS (modmyypi.com/raspberry-pi/SD-cards-and-adaptors).

Nano

There are a number of text editors preinstalled on the Raspbian distribution image. Vi is a classic editor and has been around for 40 years since the early days of Unix, but some find its very

```

GNU nano 2.2.6 File: berryclip_01.py
# Import required libraries
import RPi.GPIO as GPIO
import time

# Tell GPIO library to use GPIO references
GPIO.setmode(GPIO.BCM)

# List of LED GPIO numbers
LedSeq = [4,17,22,10,9,11]

# Set up the GPIO pins as outputs and set False
print "Setup LED pins as outputs"
for x in range(6):
    GPIO.setup(LedSeq[x], GPIO.OUT)
    GPIO.output(LedSeq[x], False)

# Light all the leds
for x in range(6):
    GPIO.output(LedSeq[x], True)
  
```

▲ Nano editor

individual set of keyboard commands a little tricky to learn. The nano editor is a rather more straightforward alternative.

Nano is accessible from the desktop menu or from the command line in a terminal window. It still uses a series of commands, but the most commonly used ones are displayed at the bottom of the editor. For example, the control (Ctrl) plus 'o' key combination saves the file, while the Ctrl+X shortcut exits the editor.

The Raspberry Pi Spy website has an 'introduction to Nano' page and a list of Nano shortcuts (goo.gl/2UNwTD).

Networking

Networking is a key feature of every modern operating system. The subject encompasses both local networks and the internet. These days, most of us gain internet access via a wired or wireless router, but this same router can allow PCs, laptops, tablets, smartphones and Raspberry Pis to communicate with each other inside the home.

Understanding how networking technology works is an important part of computing education. To help, the Raspberry Pi Foundation has put together a series of networking lessons, with lesson plans for teachers and worksheets for students (raspberrypi.org/learning/networking-lessons).

Lesson one covers basic communication. Lesson two introduces the Internet of Things (IoT), while the third and fourth lessons cover the Dynamic Host Configuration Protocol (DHCP) configuration and the Domain Name System (DNS) respectively. [mm](#)

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Your Letters



Rodents and Large Particle Colliders

Your 'News and Views' section has a piece about a 'gopher' breaking the Large Hadron Collider. It was a weasel.

Please don't tell me you dumbed down in case more people understood 'gopher' than 'weasel'. Is *Micro Mart* published in the USA? This would explain things to some extent.

Alastair Cannon

Dumb down our small mammal news? Never! And to prove it, have a picture of a proper weasel.

Actually, that might be a ferret...

Broadband Speeds

Re: your article in the latest issue of *Micro Mart*, 'Broadband Speeds'.

I live 2.5 miles from Lanark in Scotland and have enjoyed fibre optic speeds since March 1st this year. I regard my area as rural.

I have attached a copy of speeds that I have obtained during the month of May and is representative of speeds obtained since March. The figures are from using Ookla as my download speed guide.

So its well done to Open Reach Scotland.

Regards,

James May (No, not him)

Why I Like Linux Mint

Although Mark Shuttleworth did well to sponsor Ubuntu Linux, the Canonical team have persisted in making it over-complex, which Clement Lefebvre's team have to undo as a basis for Linux Mint releases.

They have done this ever since Version 4 (Daryna), producing a system that has been more stable and less intrusive than successive releases of Microsoft Windows, thus coming closer to achieving Shuttleworth's dream. Indeed Linux Mint doesn't demand the often laborious application of Updates before permitting use.

Instead Linux Mint merely notifies via a red-ticked shield symbol that Updates are available, which can be applied whilst continuing with other tasks, such as its multi-tasking robustness.

The latter also enables multiple virtual desktops that Microsoft has been unable to replicate. For example, whilst browsing the Internet it is possible to create notes with screen-shots on another virtual

desktop, whilst the Force Quit tool can close down applications without crashing everything else. It's also possible to restrict Updates to those have been tested, so I am a Linux Mint fan, especially since finding a better way to install it which I have called BruceWay, to distinguish it from other methods.

Whilst there are many folk seeking changes to function and appearance, I simply use it as a platform for safely installed and configured applications, thus avoiding the glitches of default settings. Whilst 32-bit MATE LinuxMint Debian Edition (LMDE) installed on a 32GB SanDisk UltraFit device has been useful for old PCs, BruceWay has also allowed the creation of a triple-boot, SSD-enhanced E5700 PC for Linux Mint, Windows 7 and Windows 10, together with FLOSS (Free Libre Open Source Software), thereby confirming Mark Pickavance's words and reducing the impact of forced changes to Windows.

Bruce R

GET IN TOUCH...

By email

letters@micromart.co.uk

By post

Micro Mart
30 Cleveland Street
London
W1T 4JD

Online

forum.micromart.co.uk

Component Watch

Looking for a fitness tracker for the summer? Check these out

Now that the summer months are (theoretically) here, you might be thinking of getting in shape. And what better way to do that than with the latest wearables? We've looked at a selection of affordable fitness bands and activity trackers to pick the best one for this summer season – assuming it actually gets started.

Deal 1: Milestone Altitude Activity Tracker

RRP: £34.99 / Deal Price: £21.29

One of the cheapest activity trackers around, the Milestone Altitude tracks steps taken and distance travelled, and uses them to give you an estimated number of calories burned as well. There are two modes – sleep and day – and it also comes with a silent vibrating alarm to gently wake you up in the morning. It's water-resistant for outdoor use, and its app is compatible with iOS 7.0+ and Android 4.3+. Bargain.

Where to get it: Kikatek – bit.ly/1006mZ8



Deal 2: Jawbone UP2 Activity Tracker

RRP: £59.99 / Deal Price: £39.98

The Jawbone UP2 activity tracker doesn't have a screen, but it does have three single-colour LEDs, which can be used for notifications and alerts. There are three levels of sleep-tracking included and activity tracking includes steps, distance, calorie estimation and more. The built-in smart coach app also helps you personalise your training and activity goals so you're always getting the best advice for you!

Where to get it: Scan – bit.ly/1Y4GDob



Deal 3: Acer Liquid Leap Smart Activeband

RRP: £69.99 / Deal Price: £50.74

Acer's Liquid Leap smartband includes a 2.4cm touchscreen so you can use it independently of your phone, but it also allows you to operate your phone from



the band, including checking your email, controlling your music and triggering your camera. It does both sleep and activity tracking and it's waterproof, so the only time you'll have to remove it is when it's being charged. A great all-rounder, especially at this price.

Where to get it: Ebuyer – bit.ly/22Ai0zX

Deal 4: FitBit Flex Activity Tracker

RRP: £89.99 / Deal Price: £59.00

Fitbit are pretty much the kings of mid-to-high priced activity tracking, and the FitBit Flex remains one of the best examples of its kind. You get a five-LED display, which can display progress towards and number of goals, wireless syncing with your phone or other Bluetooth device, sleep tracking and alarms and the usual set of activity stats tracked. The app also allows you to log food and workouts for a complete all-in-one health tracking solution.

Where to get it: Tesco – bit.ly/1RQWNtC



Deal 5: Mag Echo Smart Running Watch

RRP: £99 / Deal Price: £89.99

Although it looks like a smart watch, the Mag Echo is really more of a watch-shaped fitness band, since it doesn't run apps; it's all about tracking your movement. It does have a watch mode, but a few presses of a button gets you access to sleep-tracking, step-tracking, distance-tracking and features commonly associated with running watches, like timers and lap counters. Unlike most trackers, this one uses a standard watch battery, so you don't have to charge it and can get over six months without needing a replacement!

Where to get it: Wiggle – bit.ly/1TYdtUP





40 Million PS4 Consoles Sold

But not all at the same time, of course

Xara Upgrades Photo Editing Package

Update guarantee brings regular updates throughout year

Fans of Xara's software might like to know that the company's new Update Guarantee initiative, bringing regular software updates throughout the year, has been brought into effect for the firm's newest release, Photo & Graphic Designer 365.

The software promises to be easy to use (don't they all?) and provides all the tools needed for a whole range of graphic design and photo editing tasks. Not only that, but this latest version of the package also provides "exciting" new photo tools (if you happen to find that kind of thing exciting), SmartShapes, significant text enhancements and some great new content.

Within that new content are two new types of photo grids: Static and Smart. Static photo grids are simple fixed grids onto which users

can drag and drop their own photo, while Smart grids smartly resize to fill the rectangles as photos are added or deleted, and photo positions can also be swapped. Add to this nearly 30 photo filter presets, an Effect Painter tool allowing for direct painting into a photo to brighten or to add other effects such as saturation and dodge and burn, plus flexible text handling, and you have yourself the makings of a very full editing package indeed.

Along with the Update Guarantee, users also get an enhanced online content catalogue with a free library of over 500,000 royalty-free photos, and all of this is available for a closer look at www.xara.com. The cost, by the way, is £49.99 (upgrades from the previous version are half price).



Sony has announced to the world that it has sold around 40 million PlayStation 4 consoles around the globe.

The fastest-selling console in Sony's history, the PS4 has done rather well for itself, helped no end by the success of titles such as the recently released *Uncharted 4: A Thief's End*,

which recorded a quite marvellous 2.7 million units in just one week.

The president of Sony Interactive Entertainment said of the sales achievement, "We are truly grateful for the enormous support from our fans and partners across the globe, which helped us achieve this significant milestone in such a short span of time."

Videos Made Easy With Magix

Redesigned interface and a ton of wizards

Magix's Video easy HD package has been renewed, which could be good news for amateur editors.

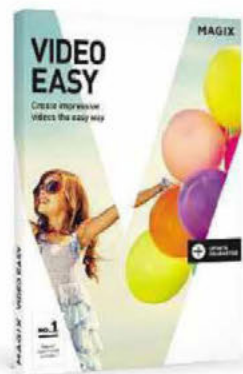
Video easy HD promises to help users to create the perfect video in just three simple steps, which is always the kind of thing time-poor editors like to read. The software has also been handed a redesigned program interface and a whole lot of helpful wizards and automations that help users to edit and share their own videos without any previous experience necessary.

The software's native 64-bit architecture and H.264 support let users import, edit and export videos faster than ever before

while the three steps towards creating a video – import and edit, optimise, and present – all promise to be handled well. On the video optimisation side of things, this new version of the package contains a bunch of tools allowing for creative freedom including automatic image optimisation, backlight correction, lighting conditions adjustment and new blur transitions.

As for presenting, video can be burned-in resolutions up to 4K to DVD or Blu-ray, uploaded directly to YouTube and Facebook from within the program itself, while videos can also be transferred to mobile devices (iOS and Android), which is nothing

more than you'd expect these days. The price is set at £29.99 from www.magix.com, which isn't too bad at all. As ever with Magix, you can also trial the software beforehand for 30 days.



Several years ago, I had a Nintendo DS, and I purchased a cartridge that allowed it to play video. But it wouldn't play ordinary video files; they had to be encoded into a format the DS could read. This took a while and, to be quite honest, the result wasn't all that great. But it worked, and I appreciated that.

I also did something similar with the Nokia N-Gage (yes, I know), re-encoding files before they could play.

These days, of course, operating systems like Android and iOS make it easy to play nearly all file types, and the processing power of modern mobile devices means they can even play full HD videos. The need to re-encode files, then, is far less prominent than it used to be.

I was reminded of doing this, though, by Mark Pickavance's look this week at things we used to do with computers, which we no longer do today.

How about you? Are there activities you used to carry out that you have been made unnecessary by new technology? Tell us all about it at letters@micromart.co.uk.

Anthony

Editor

Meanwhile... On The Internet...

While 'mega breach' (tinyurl.com/MMnet17a), or 'megabreach' if you prefer (tinyurl.com/MMnet17b), may not be a totally new phrase in our lexicon – Symantec's *Internet Security Threat Report* (tinyurl.com/MMnet17c), declared 2013 to "The year of the Mega Breach" as far back as April 2014 – it's certainly a word that has been rolled out significantly more over the last few weeks (tinyurl.com/MMnet17d). Indeed, the endemic patter theft (tinyurl.com/MMnet17e) of the internet tech news juggernaut has rendered it as the term *du jour* for hacks that have made allowed a massive number of account credentials to flood the public domain recently (tinyurl.com/MMnet17f).

It's usage is far from common, and it is yet to feature on Wordcount's fascinating list of the most commonly used words in our language (tinyurl.com/MMnet17g), or the same site's wonderfully meta Querycount, which ranks the words searched for using Wordcount (tinyurl.com/MMnet17h). Despite this, it does seem a fitting way to describe the hundreds of millions of account details and poorly-encrypted passwords lifted from the systems of LinkedIn (167m), Tumblr (50m), MySpace (360m) and Fling (40m) and eventually put up for sale online by someone operating under the moniker Peace_of_Mind (oh, the delicious irony).

The only upside to all of this, is that none of these breaches are new; in fact, some date back five years. However, that doesn't mean that people's tendency towards slapdash password choice (look at this list of the most common passwords from the LinkedIn hack, have and little sob to yourself, and then wonder if much has really changed in the last three years: tinyurl.com/MMnet17i, reluctance to change passwords regularly and penchant for linking multiple accounts for convenience hasn't lead to real world consequences (tinyurl.com/MMnet17j), or that the data hasn't been doing the rounds under the radar for all that time.

The bottom line here is probably that anyone seriously nefarious has probably been making use of this data for quite a while and now moved on, but the ripples will continue for quite a while. When Troy Hunt of haveibeenpwned.com ranks the hacks we've mentioned as four of the top five breaches in his database (only the 2013 Adobe hack breaks up the quartet, at number three), notes that they amount to around two-thirds of the data in his system, muses on the curious fact that all of these have come to light in such a short space of time, and concludes his blog on the matter (tinyurl.com/MMnet17f) by noting that he "honestly [doesn't] know how much more data is floating around out there, but apparently it's much more than even I had thought only a week ago", you kinda know it's not great, right?

If you like your internet security paranoia to be of the fresh, 2016 variety, don't worry – we've got a little something for ya right now. Specifically, it concerns the has-it-hasn't-it hack of remote access/online meeting service Teamviewer (tinyurl.com/MMnet17k), which has been a topic of hot debate in the days before we go to press.

What's not in question, apparently, is that the German firm's systems went offline on June 1st under the stress of a DDoS attack (tinyurl.com/MMnet17l). What is more controversial, is claims that since it managed to get back online, users have seen their machines hijacked and money stolen as a direct result (tinyurl.com/MMnet17m). A couple of high-profile Reddit threads (tinyurl.com/MMnet17n) quickly became the go-to source for horror stories (tinyurl.com/MMnet17o), with some users going into great detail (tinyurl.com/MMnet17p). Unsurprisingly, the TeamViewer subreddit subscriber numbers exploded (tinyurl.com/MMnet17q) at the same time as people searched for news and advice (tinyurl.com/MMnet17r).

The firm itself, however, was having none of it. Even in the face of some very insistent customers, it went straight for the 'nothing to do with us, guv' card. In a couple of rather blunt statements (one of which was strangely dated a week prior to the event – insert your own conspiracy here – tinyurl.com/MMnet17s) it alleged that "Unfortunately, users are still using the same password across multiple user accounts with various suppliers. While many suppliers have proper security means in place, others are vulnerable." and reiterated that "There is no security breach at TeamViewer."

Reddit, and some other news outlets, appear unconvinced by its assurances, however. Such strident statements are meant to inspire confidence in the product, we suppose – but, should they turn out to be misleading, or just wrong, it's the kind of victim shaming that could put several more nails in a company's coffin instead.

We're sure that you will join us in playing your tiniest violin (tinyurl.com/MMnet17t) for the people Blizzard have so far banned from *Overwatch* (playoverwatch.com) for the use of aimbots and other hacks (tinyurl.com/MMnet17u). A recent post on the game's Chinese forum named and shamed around 1,500 users that had fallen foul of its well-documented, widely reported, headline policy on unfair play (tinyurl.com/MMnet17v) and other evidence suggests (tinyurl.com/MMnet17w) that Western cheaters aren't having any easier time of it (tinyurl.com/MMnet17x).

While, as *PC Gamer* points out, there is a chance of false positives here, it's a laudible campaign from makers of *Warcraft* – one that some other games could take note of. *Battlefront*, we're looking at you. Yes... yes, we are...

.AVWhy?

Videos For Your Eyes...
Not Necessarily For Your Brain

You may well have seen the golf.com YouTube channel's video of the giant alligator crossing the third hole at Buffalo Creek Golf Club (tinyurl.com/MMnet17y) and wondered, like us, whether it was some clever employment of CGI in order to create some viral buzz (tinyurl.com/MMnet17z). We're not alone in being that cynical, apparently (tinyurl.com/MMnet17aa), but apparently this is one case where seeing really does mean believing. While we don't trust much we see on the interwebs, we do trust the good folks of Snopes.com, and if they have taken the time to check, and say it's the real deal, then that's good enough for us (tinyurl.com/MMnet17bb).



Caption Competition



This chap was the subject of the Caption Competition in *Micro Mart* issue 1415, and here are the best suggestions you came up for this week:

- **JayCeeDee:** "Trial of new hearing aid hits a problem!"
- **Dwynnehugh:** "You know that little voice in your head – it's just got louder!"
- **Ondrive:** "Fitbit's new Personal Training wearable was a bit over the top..."
- **EdP:** "The next evolution of the 'Snooper's Charter'. Big Brother is not a patch on mini-GCHQ."
- **doctoryorkie:** "It's Monday morning. Turn off *Warcraft* and get a shave."
- **Ondrive:** "Microsoft's augmented reality motivational app – known as 'Shouty' – meets with a mixed response from consumers..."
- **Thomas Turnbull:** "It seems I'm being headhunted by a smaller company."
- **Thomas Turnbull:** "Microsoft is making changes to Cortana to make it more personal."
- **Thomas Turnbull:** "I keep hearing voices saying that Windows 10 is ready to be installed."

The winner this week, however, is regular contributor Thomas Turnbull, with "I keep hearing voices saying that Windows 10 is ready to be installed." Nice one, Thomas!

If you have a caption for the picture below, head to the 'Other Stuff' section of our forum (forum.micromart.co.uk), or email us your funnies via caption@micromart.co.uk, remembering to add the issue number to the email.



Tim Cook: Teach Coding To Kids

Primary school children are the focus

Apple head Tim Cook has spoken at the Startup Fest Europe event in Amsterdam, and he's made quite the statement in saying that all primary school children should be taught coding alongside learning the alphabet.

Cook said at the event that coding is "just another language" and therefore it should naturally be taught in schools alongside other languages. He said that "We are doing our kids a disservice if we are not introducing them" to coding, which are powerful words indeed.

Fundamentally, Cook thinks that coding is "being absorbed by everything" and that universities should create

links with companies in order to help kids to develop their skills further. We have made some fantastic developments in coding initiatives over here in the UK in recent years, and it's great to hear a major industry voice like Cook pushing the coding conversation further. Quite right too.



Micro-Bit Now For Sale

Retail release for BBC's computer

If you have £13 to spare, then you might want to reconsider what you were going to spend it on. The BBC Micro-Bit is now available to pre-order from element14, the chaps that built the thing in the first place.

The decision to allow all-comers to buy a Micro Bit seems a no-brainer to us, allowing it

to get into more hands than the schoolchildren who were originally handed the devices this year. The spanner in the works is that element14 is only selling them in batches of 90. The good news is that the BBC reports that Microsoft and Technology Will Save Us will be among companies selling individual units. Hoozah.

Snippets!

WWII Teleprinter Cost Museum A Tenner

It's not every day that you can pick up a genuine slice of history for ten quid, but thanks to eBay and some eagle eyes at the National Museum of Computing, the museum found itself in possession of a teleprinter used in the Second World War.

The teleprinter was being advertised on eBay as a "telegram machine", and a volunteer at the museum thought it was worth a bid, as they thought it could have been related to the cipher machines used in the war. The hunch was right, as the teleprinter would indeed have been paired with a Lorenz-type machine to help crack the German codes.

What a find!

Opt Out Of Spam

Annoyed by unsolicited sales calls to your phone? Want to stop them in an instant? Then send your thanks to Ofcom for teaming with the Telephone Preference Service in bringing you a new, easy way to stop all annoying marketing calls.

All you have to do is text TPS followed by your email address to 78070. From there, you'll be sent a confirmation text that you've been added to the UK's official 'do not call' list, which means it's illegal for companies to bother you with unsolicited calls. Yay.

Hyperoptic Plans Wider Rollout

Fibre broadband provider Hyperoptic has announced its expansion to another seven cities. Those cities are Portsmouth, Watford, Leicester, Southampton, Slough, Edinburgh and Woking, and this expansion will mean that the firm has a presence in 20 towns and cities across the nation. The headline news here is that Hyperoptic is promising to give citizens access to gigabit broadband, the fastest broadband service in the UK.

Dubai Opens World's First 3D-Printed Office

Prototype building shows power of 3D

To Dubai we go now, as the government has announced what it's calling the world's first functioning 3D-printed office building.

According to Reuters, the building is apparently part of a drive by the Gulf's main tourism and business hub to develop technology that cuts costs, and this prototype building has used a mixture of cement, with reliability tests carried out beforehand in Britain and China. The building itself took just 17 days to build and has a floorspace of around

250 square metres. The printer used for this was a 20ft by 120ft by 40ft so it was rather a whopper, as you'd expect.

The Arab Emirates Minister of Cabinet Affairs was quoted by Reuters: "We believe this is just the beginning. The world will change", and while we can't see these popping up everywhere any time soon, there's no doubt this is a significant development. Hopefully, those currently occupying the building, the Dubai Future Foundation, will enjoy working in it.

Norway Goes On Ts And Cs Offensive

Campaign suggests things have got out of hand

Hey, it's not just us who hate reading through reams and reams of terms and conditions. In fact, our friends in Norway have decided that they have had just about enough and have launched a campaign against lengthy Ts and Cs in protest.

According to the Norwegian Consumer Council, the average Norwegian has 33 apps at their disposal, including the likes of YouTube, Skype and Facebook, and the terms and conditions for those apps when placed together run longer than the New Testament.

Wow. The council thinks that this is "absurd" and to prove this it launched a campaign in which Norwegians read out each of the Ts and Cs in real time via its website. That took over 30 hours (31 hours and 49 minutes, to be precise), and a spokesperson for the Council said of the readings that "Their scope, length and complexity mean it is virtually impossible to make good and informed decisions."

We're delighted that somebody is taking a serious view on this, and we can only hope this will make some kind of difference. Whether it will or not is doubtful, frankly. Shame.

Toshiba Tops Up Hard Drive Range

8TB capacity drive now in the mix

Not wanting to be left behind in the hard drive business, Toshiba has launched a new 8TB capacity desktop drive.

The 3.5" X300 drive is clearly aimed at high-end professional or gaming PCs, the 7200rpm drive coming with a 6Gbps SATA interface and 128MB cache. The key story underpinning all of this is that manufacturers

obviously still see some life in the traditional hard drive market, despite flash-based storage having been the go-to market for consumers in recent times.

While it's unclear on the website, a quick hunt around the web suggests that the drive seems to cost around £260, which isn't ridiculous given the target high-end market. The website for more information is www.toshiba.eu.

ARM Unveils VR Future

New processors will feature on next year's smartphones

ARM has announced a new Cortex-A73 processor alongside a new Mali-G71 GPU, which it claims will help to power virtual reality and augmented reality experiences on the flagship mobile devices that will be coming our way next year.

While both processors promise the usual performance and efficiency

improvements, the real headline here is that ARM is actively focusing its efforts on VR content. With these processors in place, mobile devices will also be able to handle 4K video while sustaining performance, because the Mali-G71 represents a 50% increase in graphics performance.

Virtual reality has come a long way since the humble View-Master.

No Man's Sky Delayed

Meanwhile, the world continues to spin...

One of the year's most-anticipated games has to be *No Man's Sky*. The space exploring title is a PS4-exclusive to begin with, which is a shame for PC owners of course, but it remains a title on everyone's lips, not least because it has been in development for so long.

What a shame, then, that its release has now been delayed until 10th August over here in Europe, with the good chaps at Hello Games confirming in a statement on the PlayStation blog

that, "As we approached our final deadlines, we realised that some key moments needed extra polish to bring them up to our standards."

Games have been delayed before, of course, and they will be again, and it doesn't necessarily mean that the finished product won't be any good – look at the other recent PS4 exclusive *Uncharted 4* – but delays are never fun for the consumer.

Here's hoping for everyone's sake, not least Hello Games, that *No Man's Sky* is as good as we all want it to be.

Asus Zenpad 10 ZD300C

Is this budget hybrid too good to be true?

DETAILS

- Price: £160
- Manufacturer: Asus
- Website: goo.gl/j8Ws0o
- Requirements: n/a

If you've ever doubted the importance of shopping around, then may we introduce the Z300C from Asus. Comprised of a 10" tablet and detachable keyboard/speaker dock, this set sells for anything between £160 and £240.

We're going to base this review on the lowest price, available from Amazon and the BT shop, and we wouldn't suggest paying any more than, for reasons that we'll explain shortly. It's also worth bearing in mind that you can buy the Asus Z300C for around £140, which is exactly the same tablet but without the dock.

Clearly, there's very little point in not buying the dock. And that's fortunate, because it's undoubtedly the best thing about the ZD300C package. Attaching magnetically to the tablet and connecting wirelessly via Bluetooth, the dock offers both a QWERTY keyboard and a set of stereo speakers.

The keyboard, as you'd expect, is cramped, but it's perfectly usable. You can even touch type on it, although you'll need a bit of practice to avoid pressing two keys at once with each finger. The keys, though small, feel much like those found on a Macbook, and you'll find a range of shortcut keys at the top, offering useful functions like volume control, screen grabbing, wi-fi toggling, brightness control and a shortcut to the Android settings menu.

The speakers, meanwhile, are surprisingly loud, offering clear

audio for movies and music. They won't replace a dedicated external speaker, but they're better than what you get from the tablet itself. That said, the stereo speakers at the front of the ZD300C aren't bad at all for a budget device.

Unfortunately, there's little else positive we can say about this tablet, other than it comes with an SD card slot. As it turns out, you'll need that, because a good chunk of the 16GB of storage is taken up by Android and Asus's ZenUI launcher. To be fair, it's not a bad launcher: it looks good and it runs fairly well. But it's also bloated by Asus's useful but potentially unwanted apps, which can't be removed.

The good news, though, is that you won't have to worry about finding room for high-end Android games, because they won't work anyway. We tried running the racing game *Asphalt 8: Airborne* and found the loading times and menus so laggy and unusable, we weren't even able to get into a race. We can imagine it wouldn't run well,

though, because the specification of the ZD300C is poor, even for a budget device.

Its single-core and multi-core Geekbench scores were 350 and 1,029, respectively. The Kindle Fire 7, for comparison, gets scores of 356 and 1,143, and currently, you can buy that for £40. Of course, that's subsidised by Amazon, but even so, it's clear the ZD300C should offer more for its price.

Instead, you get a Intel Atom x3-C3200 processor that seems to have been underclocked to 900MHz, which doesn't match up to the ARM chips found in the Kindle Fire or even the four-year-old Nexus 7. The Mali-450MP4 graphics do little to boost performance, with our 3DMark test returning an average of 17fps across all tests. The highest it reached was 26 frames per second.

Comparing it again with the Nexus 7, this tablet has the same 800 x 1280 screen resolution, in spite of being three inches larger across the diagonal. In fact, even the Kindle

Fire, with its 600 x 1024 resolution, has a higher pixel density (149ppi versus 170ppi). Thankfully, the screen is bright, the contrast levels are good, and it looks fine in general use.

The same can't be said of the cameras, however. The front camera is just 0.3MP (otherwise known as VGA), while the rear snapper is just 2MP. This is exactly the same as the cameras on the Kindle Fire.

To make matters worse, the N-class wi-fi doesn't support 5GHz networks, the battery is non-removable and the OS is stuck at Lollipop (5.0.2), with no signs of a Marshmallow update.

Quite simply, the ZD300C is a poor performing tablet. But that doesn't mean there's no reason to buy it. Its build quality, as well as that of the keyboard dock, is excellent, and if you want a tablet hybrid device for accessing emails, the web and office software and for watching movies, then this set will do the job reasonably well for an affordable price.

If you want to do anything more demanding and you don't need the keyboard, then you're better off looking for something else.

mm Anthony Enticknap

A great dock with a below average tablet



27 Samsung Curved Monitor

An immersive viewing experience at a great price

DETAILS

- Price: £240
- Manufacturer: Samsung
- Website: goo.gl/BU4jFw
- Requirements: HDMI, DisplayPort, VGA outputs. Compatible AMD GPU for FreeSync technology

Curved monitors have grown in popularity over the last few months and have gone from being an extreme luxury item to something a little more affordable.

We've already seen a couple of examples in Micro Mart, from BenQ and Philips, and now it's Samsung's turn to show off one of its newer curvaceous displays.

The Samsung LC27F591FDUXEN is a 27" monitor with a screen curvature of 1800R, a maximum resolution of 1920 x 1080, a response time of 4ms and a 3000:1 standard contrast ratio from a VA panel. In addition to that, Samsung has also included the Mega DCR feature, which dramatically improves the visual quality of the blacks and whites on screen. Although Mega DCR may well be marketing speak, it's a feature that actually does a pretty good job of heightening the quality of the output.

Connectivity is okay, with HDMI, DisplayPort and VGA, and alongside the available inputs you'll also find a couple of audio ports and power. There's also a joystick-type control at the rear right-hand corner of the screen, which

▲ *The curve feels natural, and improves the field of vision*

when pressed will activate the OSD and allow you to navigate through the available menus.

The design of the LC27F591FDUXEN is really quite stylish. With a solid white chassis and a super-thin metallic bezel, it certainly looks the business. There's a circular metallic-looking plastic base that's connected to the monitor via a thin stand. This doesn't offer much in the way of ergonomics, for height

adjustment, but you can tilt the screen to around 20°.

As for the quality of the display, Samsung has done an excellent job here. The LC27F591FDUXEN offers a superior level of colours and crisp lines, as well as FreeSync, Samsung MagicBright, Flicker-free technology, an easy eye mode and other quality-enhancing features. Gaming, movies and even everyday work is a pleasure to view; you

could be forgiven for not wanting to return to your regular monitor after an hour or two using this model.

What's more, and something that's quite unique among monitors, the AMD FreeSync technology is available over the HDMI port, not just the DisplayPort. This gives gamers with the right hardware a better choice of how to hook up their screen; not everyone has or wants to purchase an additional DisplayPort cable.

While it may still seem more like a gimmick among the TVs, the curve does work well on a monitor, generally because you're sitting closer to it than a TV. In this case, the LC27F591FDUXEN's curve gives a far better field of vision than a standard 27" flat monitor. And the curve feels a lot more natural to the eye when viewing the edges of the screen.

We were quite impressed with the Samsung LC27F591FDUXEN. It's styled nicely, has a fantastic display and is reasonably priced. In fact, we're going to be sad to see this one returned to Samsung.

mm David Hayward

An excellent curved display, with a wealth of features



TP-Link Archer VR2600 VDSL/ADSL2 Gigabit Modem Router

TP-Link delivers a heavy duty AC class broadband router

DETAILS

- Price: £205.51 (Scan)
- Manufacturer: TP-Link
- Website: goo.gl/57Qex9
- Requirements: Cable or DSL modem

However you look at TP-Link's new flagship router, the Archer VR2600, it's a monster. Being 263mm wide by 198mm deep and 33mm high, hiding this one could be a challenge even if it can be wall mounted.

This hardware isn't all about aesthetics, thankfully. Instead it's the rather special blend of wi-fi that's the critical lure for those who want to revamp their router.

Features

- **Operation Modes:** xDSL modem router, 3G/4G router, wireless router.
- **DHCP:** server, client, DHCP client list, address reservation, DHCP relay.
- **Quality of Service:** ATM QoS, traffic control (IP QoS).
- **Port Forwarding:** Virtual server, port triggering, DMZ, ALG, UPnP.
- **Dynamic DNS:** DynDns, NO-IP.
- **VPN Passthrough:** PPTP, L2TP, IPSec passthrough, Supports up to 10 IPSec VPN tunnels.
- **ATM/PPP Protocols:** ATM forum UNI3.1/4.0, PPP over ATM (RFC 2364), PPP over Ethernet (RFC2516), IPoA (RFC1577/2225), MERIPoE (RFC 1483 routed), bridge (RFC1483 Bridge), PVC - Up to 8 PVCs.
- **Security:** NAT firewall, access control, MAC / IP / URL filtering, denial of service (DoS), SYN flooding, Ping of Death, IP and MAC address binding.
- **Advanced Functions:** Parental control, network address translation (NAT), port mapping (grouping), static routing, RIP v1/v2(optional), DNS relay, DDNS, IGMP V1/ V2/V3.
- **USB Sharing:** Samba (Storage)/FTP server/media server/ printer server, 3G/4G modem.
- **Protocols:** Supports IPv4 and IPv6



This design builds on TP-Link's earlier C2600 model with the addition of an internal modem, specified as suitable for UK use.

That makes this is a drop-in replacement for BT's Home Hub, supporting both conventional ADSL and VDSL2 standards (Infinity) with an built-in modem.

As this is also a gigabit switch with an Ethernet WAN port, it could also be used in conjunction with a cable modem, ticking that box also.

But the real special functionality is the 802.11ac implementation, where it offers a theoretical 800Mbps on the 2.4GHz frequency and a whopping 1733Mbps on the 5GHz range. Using special maths, those numbers add up to AC2600, through a popular rounding error.

If it could actually achieve that speed, it would run smack into a slight problem, that being that

gigabit Ethernet doesn't have enough bandwidth to establish a link that fast without channel bonding, a feature the VR2600 doesn't offer.

This is resolved, partly, because TP-Link built this hardware to support Multi User/Device MIMO, allowing it to simultaneously divide that wireless bandwidth between multiple users, each of whom might be communicating with a different wired target device.

If they're accessing the internet at the best speed that VDSL2 can manage, then this performance is largely moot, because the router has ten times as much wireless bandwidth as the potential upstream connection.

The target audience therefore is those that want to stream lots of high-definition video to multiple users in resolutions between 1080p and 4K.



To shift that much data around, the router has a 1.4GHz dual-core ARM processor, and that also manages two USB 3.0 ports for minor NAS duties or for sharing printers.

But they also have another really interesting function if you add the yet-to-be-released USB 3G/4G modem. This has been designed as a fail-over device, so should your VDSL go down, it flips over to a 3G/4G connection, maintaining a service.

I do really hope that when it releases this it has some means to warn customers, because using a mobile connection like it's broadband could have significant cost consequences. And I presume you'd need a dedicated SIM and account for that job.

In terms of what you get out of the box, the VR2600 is still pretty impressive, and it's also generally rather easy to set up.

If you're doing a swap, then you simply plug the VR 2600 in where your previous router went, and then fire up the TP-Link Tether application on your smartphone (iOS and Android).

This allows you to make some basic configuration selections and set the admin password, among other things. There's a full web interface you can operate once it's all up and running, should you need to create a DMZ or Static Routing.

There are only a few reservations that I have about the configuration side of this product, one being that it doesn't use the same SID for the two frequency ranges by default.

In my tests, 2.4GHz connections were fine and had good range, but they didn't deliver the level of performance I was hoping for. However, the

5GHz range was an entirely different matter, and speeds of over 300Mbps when near the router were normal.

The USB ports were also fast when shared over wireless or wired connections, justifying using the USB 3.0 specification.

If this product has a real problem, it's the price. Part of me thinks that more than £150 for a router is just too much, especially considering how rapidly this technology churns.

That said, almost all the competing products are around this price, and the majority don't include a modem internally. However, it's worth noting that one aspect that this hardware is unlikely to improve is broadband speed. You could just keep your existing hardware to perform that function and use an AC3200 class router like TP-Link's own Archer C3200 (£165) to provide the wi-fi.

Compared with the AC1300 spec of the BT Home Hub 5, the VR2600 is a significant upgrade, but it's not the quickest wireless networking you can buy. [mm](#)

Mark Pickavance

**Four-antenna AC2600
wi-fi router with internal
VDSL2 modem**



PortraitPro 15

Michael tries to improve his looks with this next software item but no such luck

DETAILS

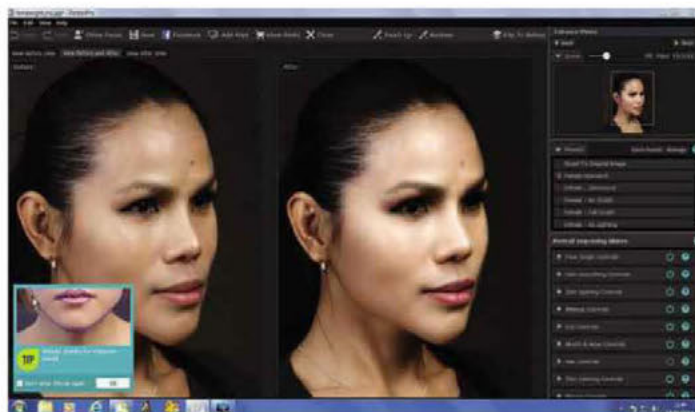
- Price: £99.95
- Manufacturer: Anthropics
- Website: goo.gl/MH3iS
- Requirements: 1GHz processor, 2GB RAM (4GB for 64-bit), 170MB disk space, Windows XP or later

It is not just celebrities, or those who believe they qualify as such, who feel the need for their digital images to be enhanced with a case of air-brushing. If you have photos you'd like to touch up, then PortraitPro from Anthropics could be just what you're looking for.

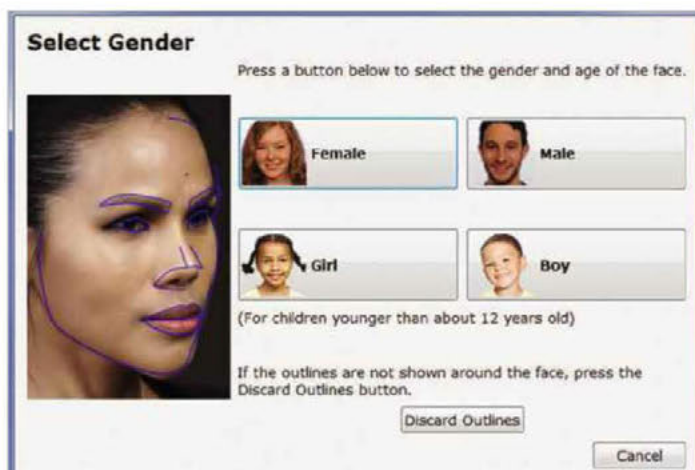
Now up to version 15, PortraitPro, as its title might indicate, acts as a digital face makeover tool with the ability to remove blemishes, and touch up and restore elements. Depending on your needs, this software is available in Standard, Studio and Studio Max editions, with the different versions being priced accordingly. My review is based on the 64-bit Studio Max version, which comes with additional features such as support for RAW files and plug-ins for Photoshop, Aperture and Lightroom.

Opening with a fairly basic interface, PortraitPro presents the user with a split screen combining a main work and viewing area, with a control panel on the right. You can remove the control panel if its presence is not required. In its opening mode, the control panel offers the user a choice of opening a single image or a batch of images using standard Windows protocols.

Selecting batch mode will bring up an Auto Batch Save



▲ Before and after view



▲ Select gender

Option dialogue box. This feature will allow you make some general selections, such as whether to use a suffix or prefix when naming the new files and selecting from a range of presets regarding the sex and age range of the subject matter. You can also opt to save images in a sub-folder of the original source or a specific folder.

Working on a single image, as you will tend to do, you need to indicate its gender, as you select from a dialogue box offering a choice of male, female, boy or girl. Showing an overlaid Tip window in the lower-left corner of the screen, the following display gives you a three-pane arrangement consisting of

before and after views of the subject and a control panel populated with a zoomable image of the current face with various presets and sliders for improving areas of the face. This is all clearly laid out, and it greatly simplifies matters.

As you move your mouse cursor over the Before image, areas of the face will be highlighted with a pen marker. While tackling areas such as mouth, nose, chin, eyes, eyebrows and hair line are generally reasonably accurate, you do have the option to make adjustments by moving anchor points. Helpfully, any alterations you make will be instantly reflected in the After image.

Along with the adjustable sliders in the control panel, you have access to some extra tools arranged across the top of the screen. Brushes are provided to touch up and restore facial attributes. In both cases, you can adjust the size and strength of these brushes using slider bars. Other options include undo/redo, save and post an image to Facebook plus create a hard copy – all fairly standard stuff.

With regards to this last option, you have the choice of using your own print facility or making use of a facility set up by PortraitPro to have prints professionally produced by Pwint.ly. These will incur an extra charge, with pricings varying between £44.99 and £125.99. This seems perhaps a tad expensive, especially seeing as these prices don't include shipping costs.

PortraitPro 15 can certainly help improve digital portraits. With a little ingenuity it can also be used to turn a reasonable portrait into something that could be considered grotesque, although it is not meant to be used in such a manner.

Whatever you use it for, it offers a great blend of user-friendliness and functionality.

mm Michael Fereday

A useful set of tools for air-brushing portraits



Corsair SF Series PSU 450W

Small system builders have a friend in Corsair

DETAILS

- Price: £69.99
- Manufacturer: Corsair
- Website: www.corsair.com
- Requirements: SFF system



Many years ago, I owned a tiny Pentax Auto 110 SLR that looked like a 35mm film camera that had been shrunk in a crazy science experiment.

Opening the box to Corsair's new SF Series PSU reminded me of the Pentax and how irresistibly cute miniaturised technology can be.

Looking at the pictures, it's easy to dismiss this design as just another ATX power supply made to the exacting standards of 80 Plus Gold certification with full cable modularisation. But what they don't convey well is scale.

This PSU is just 100mm front to back, 63mm high and 121mm at its widest point. It's specifically designed to be used in SFF cases like those often used for media centres and tiny servers.

Having owned a few of these types of systems, the PSUs that come with them are generally underpowered (300 watts or less), and they often have limited cable support and a fan that kicks in at high RPM from the point you power them up.

Amazingly, all these points are addressed here. The review model offers 450 watts and allocates a healthy 37.5A to the 12V line, with support for a single PCIe 6+2 line.

If that's insufficient for your

needs, Corsair also makes a 600W version, which has dual PCIe lines, bumping the 12V line to 50A.

Both supplies include the correct cabling for ATX12V v2.4 and EPS 2.92 standards and four each of SATA and Molex power connectors.

This connector load-out is as applicable to a full ATX rig as a standard-sized PSU. However, you can't easily fit into an ATX case, because the mounting holes aren't correctly spaced.

Corsair considered the possible reuse of the PSU in a full ATX spec design, and for an extra £5.99 it will supply a handy adapter plate.

Cooling is provided by a single 90mm fan that's

thermally controlled by the supply's own sensors. Because of that, it won't run at all unless the PC it's connected to is pulling more than 90 watts.

Fan speed scales from 300rpm at a 135W pull to 2010rpm at the full 450 watt load, and it's a specially designed NR092L PSU fan, not a repurposed case fan. The upshot of that design choice is that you won't really hear the fan at all on most systems until you use the GPU, and when it does come on, it won't be intrusive.

Efficiency on this design is also exceptionally good. On 230Vac at 100% load, it's 92.14% effective, guaranteeing that most of the power makes it to the PC.

The build quality on offer here more than justifies the price. It's built using the best 105°C rated Japanese capacitors and is superbly engineered throughout.

If I have a criticism it's that I don't see the point in the ATX lines being modular, because without them the PSU can't power up. All connectors are a possible point of failure, above and beyond one that's permanently soldered. Arguably, though, it could make a tricky SFF case installation easier.

If you're building a small system, I can't recommend the Corsair SF Series more highly.

mm Mark Pickavance

A tiny PSU that's equal to its bigger brothers



From Bedrooms To Billions: The Amiga Years

From humble beginnings, a technical icon grew

DETAILS

- Price: £3.99 rental/£10.54 purchase
- Manufacturer: Gracious Films
- Website: goo.gl/13Mql6
- Requirements: Vimeo account, downloadable MP4 viewing

The second documentary from Anthony and Nicola Caulfield of Gracious Films is now available. And instead of looking at the history of British influences on the gaming world and the technology behind it, it's time for one of the most iconic home computers ever developed: the Amiga.

As with the original *From Bedrooms to Billions*, the documentary starts with the humble beginnings of what would become a machine far beyond its time. It opens with late Ralph Baer, inventor of the Brown Box and credited as the father of videogames, then moves on to interviews with Joe Decuir, Larry Kaplan and Trip Hawkins, providing the history of Atari and how the key players in the history of the Commodore Amiga found their place.

The emphasis here is on the innovation that brought a diagram drawn on graph paper to something physical, in the form of several sizeable breadboards with a multitude of criss-crossing wires. The real genius from there lay in the fact that the hardware engineers, most notably Jay Miner, took this prototype for



▲ *From Bedrooms to Billions: The Amiga years charts the history of the iconic machine*



▲ *Interviews with key people lead you through the beginning of the Amiga, through to the height of its success*

a new computer and turned it into the multimedia chips used in the Amiga.

There are numerous accounts of how Atari changed its management structure and how through one way or another, various people eventually decamped from the company and came together under the Hi-Toro brand, which was later renamed to the Amiga Corporation.

It's an extremely engaging history, with its fair share of ups and downs, and the Caulfields manage to keep the flow of the story without reducing the core of the documentary to the vilification

of one party or another.

Toward the end of the first half of the film, you get a real sense of just how precarious the future of the Amiga computer actually was. And with that, an idea of how very different things could have turned out.

It also covers the tumultuous relationship between the Amiga and Jack Tramiel's Atari – complete with his philosophy of "business is war". Again, it's an eye-opening account of what happened at the time from the people who were in the firing line.

The second half of the documentary looks at the



software side of the Amiga, the gaming in particular, but also the demo scene and some of the more iconic programs that musicians and artists of the time used. Here we see just how advanced the Amiga really was, in that the programmers of the day could create some incredible things with the hardware at their disposal.

The documentary instills the sense of the pioneer, from the early days of the foundation of Atari to the view of the Amiga circuit diagram written on a whiteboard – which is something that's often talked of during the interviews.

Just like the previous film, this documentary pitches itself perfectly to those of a certain age, as well as enthusiasts and those interested in history, without stretching itself too thinly over its two and half hours running time.

In short, for a mere £3.99 rental or £10.54 purchase, *From Bedrooms to Billions: The Amiga Years* is an engaging and thoroughly interesting exploration of an influential and iconic computer.

mm David Hayward

Another superb exploration into our technical history



Lumo

An enchanting breath of fresh air in the form of an isometric adventure

DETAILS

- Price: £14.99
- Manufacturer: Triple Eh?/Rising star Games
- Website: goo.gl/osbILQ
- Requirements: Windows 7 or later, Linux, Mac OS X, dual-core 2.4GHz CPU, 4GB RAM, Nvidia 670 or better



▲ Lumo has its fair share of head-scratching puzzles to overcome



▲ Challenges are plenty, but very rewarding

Those of you old enough to recall the likes of *Head over Heels*, *Fairlight*, any of the *Ultimate* games and other such wonderful 3D isometric classics of the 8-bit era will instantly look at *Lumo* with fondness. This is a game in which the best elements of the aforementioned games have been combined and lovingly crafted into a modern adventure.

Having been magically transported into an 8-bit isometric world, the young protagonist must find his or her way through a maze of rooms and locations. At first you can't do much as a character; you have limited jump abilities, and contact with water is fatal. However, as you progress, you collect upgrades that enable you to jump higher, swim and cast a light from the end of a staff to stave off giant spiders and reveal hidden pathways.

Along the way, you'll come across collectible items such as tapes, coins and rubber ducks, all of which add to the challenge of thoroughly exploring an area before moving on. Ultimately, though, your target is to locate four main pieces of ancient computer components

– a task that's far easier said than done.

Graphically, *Lumo* is a delight. The isometric projection is perfect, offering you just enough visibility to work with, but while also hiding some areas from view and forcing you to either approach each room with caution or to spend a little more time seeing if there's a hidden room.

Most rooms involve some form of puzzle: finding an object to unlock a door, pulling a lever on some remote level to operate a lift on another, or locating the wheel of a mine cart to engage one of the many mini-games. Other rooms, though, require a higher degree of

dexterity that's missing from most modern games.

The challenge of *Lumo*, therefore, comes from several angles. You have to explore to advance, you have to time your jumps to dangling chains and thin beams over certain death, and you have to be prepared to retrace your steps frequently – oh and die. A lot.

Loss of life comes quick in *Lumo*, and often many times in a single room, before you work out the right method of circumnavigating the obstacle. It may sound frustrating, but it only adds to the game's many qualities.

There are also countless nods to an older generation of gamers. Look carefully enough, and you'll notice a

mention of *Manic Miner*, *Monty Mole* and even pokes for *Head over Heels*. When collecting the tapes, you'll catch a quick soundbite of a Spectrum loading noise, and at the very start of the game, see if you can identify the loading screens of the Spectrum games in the background.

The minigames we mentioned earlier give you a quick breather from the main adventure, and again you'll find many references to classic titles and even movies. *Raiders of the Lost Ark*, *The Lord of the Rings*, that mine cart chase in *Temple of Doom* are all there. And there are also mini-games that ape *Trailblazer*, *Nebulus* and even a spot of *Jet Set Willy*.

Lumo is a fantastic indie title. The developer, Gareth Noyce, has done an excellent job of mixing up the past and present. Great fun and worth every penny.

mm David Hayward

Delightful and challenging, with heaps of nostalgic references



GROUP TEST

PC Sticks

With x86 technology now being used inside tablets and phones, it was inevitable that we'd one day end up with some really small PCs.

The PC stick is the result of the miniaturisation of that technology, and we can now enjoy the latest version of Windows on something that plugs into the back of a TV or monitor and measures only slightly more than a standard USB stick.

PC Sticks

Hannspree Micro PC

DETAILS

- Price: £80
- Manufacturer: Hannspree Micro PC
- Website: goo.gl/GG71hr
- Requirements: Keyboard, mouse, Windows account

The Hannspree Micro PC was one of the first PC sticks to hit the market, beating the Intel

Compute Stick by a good few months.

Inside it, you'll find a quad-core 1.83GHz Intel Atom Z3735F, 2GB of DDR RAM, Intel HD Bay Trail graphics and 32GB of Samsung eMMC NAND storage. Furthermore, there's Bluetooth 4.0, 802.11n wi-fi, a micro-USB port for power, a full sized USB 2.0 port and a micro-SD card reader to further expand the storage. Ingeniously, all this manages to fit into a shell measuring just 110 x 38 x 9.8mm and weighing 38 grams.

The Micro PC consists of a hard, piano-black shell, with the aforementioned ports dotted either side, in between some heat exhaust vents. It terminates at one end with a protruding HDMI connector, next to which is located the tiny push power button.

The Micro PC comes with a copy of Windows 8.1 Bing Edition pre-installed, with the obvious free route to Windows 10 (for the time being, anyway). All you need to do is simply plug the HDMI section of the device into a relevant socket on your TV or monitor (there's even an HDMI extension cable provided in the box if you're struggling to fit the wider than normal Micro PC) and provide power through the micro-USB port with the supplied 5V 2A power adapter.



Due to the processor inside the Micro PC being of the x86 variety, everything you would normally install on a standard desktop PC can be installed on this device without any perceivable problems. That means you'll be on familiar ground to begin with and can happily install VLC, Office and even Steam. There's also the potential for more niche project work, like a retro emulator machine or some kind of kiosk PC.

The Micro PC is also surprisingly quick, considering its diminutive dimensions. Booting the OS takes a tad less than 16 seconds, and the desktop and UI is extremely smooth and perfectly operable. Furthermore, when connected to our network, browsing our video collection on the NAS drive worked a treat, as did normal internet duties.

We tested the Hannspree Micro PC with a selection of HD films, all of which played perfectly well, thanks to the decent hardware h.264 video decoding built into the Atom processor. At full 1080p, there wasn't any hint of a struggle from the tiny PC, and thanks to the HD audio through the HDMI connector, a connected soundbar to the TV provided the ultimate in ultra-small home theatre PCs.

Gaming isn't something you'd expect from a PC stick, so don't expect something like *The Witcher 3* at the highest possible graphical detail. Older titles will fare better, but it's still a struggle for the Micro PC.

The Micro PC did get a little warm to the touch after we'd finished putting it through its paces. Obviously there isn't a fan hidden somewhere in the case, so all heat has to be pushed through the tiny ventilation holes on the sides of the device. This isn't too much of a problem, though, despite how it sounds. Although it was warm to the touch, the Micro PC never overheated, even when left dangling around the generally poorly ventilated back of our TV.

At around £80, the Micro PC is reasonably priced and an interesting device to consider.



Archos PC Stick

DETAILS

- Price: £77
- Manufacturer: Archos
- Website: goo.gl/b4Jif8
- Requirements: Keyboard, mouse, Windows account

The Archos PC Stick is one of the latest models to be released, and it's the youngest of this group. We recently managed to review one on its own, so we thought it would be a good opportunity to see how well it fared against the competition.

This particular device measures 113 x 37.6 x 18mm and weighs 60g. Inside you'll find a 1.33GHz Intel Atom Z3735F quad-core processor, a 311MHz Intel HD GPU with a burst frequency of 646MHz, 2GB of memory, 32GB of eMMC storage, and Windows 10 32-bit Home Edition.

Connectivity consists of 802.11n wi-fi, Bluetooth 4.0, a full-sized USB 2.0 port, a micro-USB port, 5V power, power button and a micro SD card slot for up to 64GB cards. Naturally, removing the lid from one end of the stick will reveal the HDMI connector that plugs into the monitor or TV.

The PC Stick itself comes in a light metallic blue plastic cover. It's lightweight enough to not put too much stress on the HDMI input of the display you're plugging into, but attaching other USB cables to it can cause a bit of a problem if they're not long enough, plus they add extra weight.

There are plenty of vent holes on both faces as well



as the sides to help cool it down. Thankfully, though, the Archos PC Stick doesn't get too hot, even after being powered up for some time. It's certainly a lot cooler to the touch than the

does have a slight impact on the overall performance of the device.

Media duties performed well enough, although we did see a slight stutter on some 1080 HD videos when

some of the lightweight titles in your Steam library. Again, though, it makes for a cracking retro emulator.

The Archos PC Stick may well be slightly underpowered in comparison to other sticks, but it's still a good little PC. Plus, it's cheaper than most of the other models in the group at just £77, which isn't a huge saving, but a saving nonetheless.

“ Doesn't get too hot, even after being powered up for some time ”

Hannspree Micro PC and cooler than a tablet that's been running full pelt for an hour or so.

While the combination of Z3735F and 2GB of memory is something we've already seen in the Hannspree Micro PC, this version has a lower clock speed. While only around 500MHz slower, it

resuming from a pause or when skipping through the timeline. The likes of Netflix and BBC iPlayer, though, played without any problems.

The lack of processing grunt also affects the other duties that the Archos PC Stick can carry out. PC sticks aren't gaming machines, but you may even struggle with



PC Sticks

Lenovo Ideacentre Stick 300

DETAILS

- Price: £130
- Manufacturer: Lenovo
- Website: goo.gl/Dc3rZM
- Requirements: Keyboard, mouse, Windows account

It makes perfect sense for the likes of Lenovo to get in on the PC stick scene.

After all, these are micro-sized PCs and can offer business users a handy, fully working machine that's pitched better than some of the terminal machines we've seen in the past.

Sadly, the Lenovo Ideacentre Stick 300 doesn't bring anything new to the table. It's powered by an Intel Atom Z3735F processor 11n 1.33GHz, with an accompanying Intel HD GPU at 311MHz – the same spec processor as found in the Archos PC stick.

It has 2GB of DDR3L-RS memory, 32GB of flash storage eMMC and Windows 10 32-bit Home. In terms of connectivity, you get micro-USB 2.0 for power, a full-sized USB 2.0 port, an SD card reader for cards up to 32GB, 802.11n wi-fi and Bluetooth 4.0.

It measures 100 x 38 x 15mm and weighs around 50g, which makes it ever so slightly smaller and lighter than the Archos model and more in line with the dimensions and weight of the Hannspree Micro PC.

The design is obviously very similar to the other models on test, with the HDMI connector under a removable cap at one end, variously placed vent holes and the other ports located along the sides. The difference here, though, is the fact that the Lenovo



“ In spite of its superior build, it has a major downside: the price ”

Ideacentre Stick 300 is a somewhat better quality build than the Hannspree and Archos models. It lacks the colour of the Archos PC Stick, this being matte-black with glossy black sides, but it feels a more sturdy device, using a better quality plastic casing.

In terms of performance, the Lenovo Ideacentre Stick

300 performed pretty much the same as the Archos PC Stick. Video playback at 1080 HD was fine, although it didn't like resuming from a lengthy pause or skipping through the video timeline too much.

Other PC duties such as photo viewing and lightweight gaming worked well enough.

We liked the fact that the Ideacentre Stick 300 didn't get too hot after prolonged use. In fact, we'd go so far as to say it was significantly cooler to the touch than the Archos PC Stick. We put this down to the better quality build of the Ideacentre Stick 300.

But in spite of its superior build, it has a major downside: the price. At around £130, it's the most expensive PC stick of the entire group, by quite a few pounds.

That said, the Lenovo Ideacentre Stick 300 is a good PC stick to consider. The average consumer, though, will more than likely look elsewhere.



Intel Compute Stick

DETAILS

- Price: £125
- Manufacturer: Intel
- Website: goo.gl/tfCWJJ
- Requirements: Keyboard, mouse, Windows account

The original PC stick, if you will, the Intel Compute Stick was announced amid much enthusiasm a few years ago at CES and had all present in a bit of a lather.

The design was different from anything we'd seen previously: smaller, with more performance and in the same design as a standard USB stick. However, when it was finally released, Intel missed the boat by a good few months, with other PC sticks having already established themselves, and the result was rather underwhelming.

Now, though, we have the second-generation Intel Compute Stick, complete with a 1.44GHz Intel Atom x5-z8300 quad-core processor, a 500MHz Intel HD GPU, 2GB of 1600MHz DDR3L memory, 32GB of flash storage and Windows 10 64-bit Home.

Connectivity includes 802.11ac wi-fi, Bluetooth 4.0, a pair of full-sized USB ports (one USB 2.0 and the other USB 3.0) and an SD card reader that'll happily take cards up to 128GB in size.

The design is slightly different to the original Intel Compute Stick. This version is a little bigger, measuring 113 x 38 x 12mm and weighing just under 100g. The extra size and weight are thanks to a tiny fan that Intel has installed toward the HDMI end of the Compute Stick. As

with the other examples, there are numerous vent holes punctured around the device, with a larger section above where the fan sits.

The fan is of course very silent, and although you can barely feel it when you place your hand over the vent holes,

keep up with a Microsoft Surface 3. Needless to say, the 1080 HD video test ran perfectly well, and we even managed to get some good frame-rates in a collection of games from our Steam library.

We did see a rumour that the x5-z8300 was capable of

“ The performance of the Intel Compute Stick was excellent ”

it appears to do a good enough job of keeping the entire setup cool. The Compute Stick is also much like the Lenovo model, in that it has a far better quality build than some of the other examples here. It also has the same matte-black finish plastic, with sections of glossy black plastic scattered here and there.

The performance of the Intel Compute Stick was excellent, outshining everything we've previously had to test. We'd even go so far as to say it'll

delivering 4K quality video, but when we tried with some of the examples on YouTube, the Compute Stick refused to play. Perhaps this is something we can see in new models in the coming years.

The boost in performance and quality build comes at a price, though: around £125 to be exact. While it's not as expensive as the Lenovo model, it's still quite a lot of money to fork out on. However, the Intel Compute Stick is the best performer here, so you get what you pay for.



PC Sticks

Asus Chromebit CS10

DETAILS

- Price: £90
- Manufacturer: Asus
- Website: goo.gl/wyklAV
- Requirements: Keyboard, mouse, Google account

Something a little different now in the form of the Asus Chromebit. While having a Windows PC Stick is great, Windows isn't always the best choice of operating system to fit into such a low-performing device. With that in mind, Asus has opted for Chrome OS.

The Asus Chromebit CS10 consists of a 1.8GHz Rockchip quad-core RK3288C processor, a Rockchip Mali T764 GPU, 2GB of LPDDR3L memory and 16GB of eMMC storage.

Connectivity comes in the form of a single USB 2.0 port, 802.11ac and Bluetooth 4.0. The eagle-eyed among you will already have noticed the lack of an SD card slot, which seems like an odd omission.

The Chromebit is quite a slender device. It measures 123 x 31 x 17mm and weighs 75g. At one end, there's the HDMI and at the other there's the USB port, with the power situated on one of the sides.

As far as the quality goes, it's reasonably good, if a little cheap feeling. It's not as good in terms of build quality as the Lenovo or Intel sticks, and it does feel quite flimsy when next to the Hannspree model. It's functional enough, though.

The performance is a bit of a mixed bag. While Chrome OS is fluid enough, we did have some trouble when it



“ We experienced all manner of playback problems, including stuttering ”

came to playing the 1080 HD video via our NAS. Using VLC for Chrome, we experienced all manner of playback problems, including stuttering, refusal to resume from a pause and no output at all. If we left the video to play, there was a lot of screen tearing during fast paced scenes.

Lightweight Chrome OS gaming didn't work out too well either. There were times when the devices lagged and the frame-rate dropped to the

point where we thought we'd have to pull the plug.

One major advantage is the inclusion of 100GB of Google Drive space for two years.

The lack of Windows may put a lot of users off. While Chrome OS has its benefits, it's not really an OS that we've come to appreciate in the same way as a 'true' Linux distro, Android or Windows.

Don't get us wrong; it's not that the Asus Chromebit is a poorer relative to the other PC sticks, but it seems that

Chrome OS isn't quite as good an operating system as the others we've mentioned.

The Asus Chromebit CS10 may lack some of the punch the other sticks have to offer, but for those who prefer Chrome OS, it's certainly an okay stick. However, the £90 price seems a little steep.



MeeGoPad T02

DETAILS

- Price: £60
- Manufacturer: MeeGoPad
- Website: goo.gl/kk6h8o
- Requirements: Keyboard, mouse, Windows account

The MeeGoPad name has improved somewhat over the last few years. Since it first started to appear on eBay, selling Chinese imported technology, its quality of products has gone from the really cheap and often quite nasty, to the sit up and take notice variety.

There's quite a range of MeeGoPad devices these days, including various PC sticks such as the T02. This device features a 1.33GHz Intel Atom Z3735F 11n, a 500MHz Intel HD GPU, 2GB of LPDDR3 memory, 32GB of eMMC storage and either Windows 10 32-bit Home or the latest version of Ubuntu.

Connectivity comes in the form of a pair of USB 2.0 ports, a 3.5mm audio port and a micro-SD card with support for cards up to 64GB in size. You also get 802.11n wi-fi and Bluetooth 4.0.

The design is a little different from what we've already seen. It measures 115 x 54 x 10mm and weighs just over 50g. While still a flat device, the opposite end of the HDMI connector is formed to a narrow head, and the device seems a little thicker than the others we've looked at so far.

Sadly, it also feels very cheaply made. There's nowhere near the same level of quality that we've

seen in the likes of the Intel, Lenovo, Archos or Hannspree PC sticks, with the T02 having a flimsy plastic shell that, despite the various vent holes, gets extraordinarily hot after an hour or so of use.

The performance of the MeeGoPad T02 wasn't much different to that of the Archos or Hannspree models. Video playback at 1080 worked well, as did photo viewing and some lightweight gaming from our Steam library and the Windows App Store. The only real major concern was the level of heat produced, where it could cause a

problem if the device is powered up for some time.

Since the MeeGoPad T02 is a somewhat cheaper imported PC stick, it goes without saying that it doesn't cost as much as the other PC sticks in the group. In fact, you can pick one up for around £60, although we saw one for as little as £46. So far, we haven't been able to get a confirmed price for the Ubuntu version of the T02.

The MeeGoPad T02 performs no differently to a few of the other devices in this group, and for the cost, you could be thinking it would be worth investing in.

But it isn't a well-constructed device and, in truth, you could be wasting your money should the one that turns up be one that overheats and goes pop under the strain.





Intel Compute Stick

Although it's quite expensive, the Intel Compute Stick is the best PC stick out of the entire group.

The performance is better, and its design and build quality is far better too – all of which makes it worth the higher price.



Archos PC Stick

The competition was pretty tight for the runner-up spot, but we think the Archos PC Stick may have it, thanks to its price and okay performance.

We also liked its build quality and its design too.

How We Tested

Each PC Stick was connected to a 42" LG smart TV, with a Bluetooth keyboard and mouse. We used a selection of 1080p YouTube videos, as well as a selection of HD movies from a NAS drive. For gaming, we used various old computer and console emulators, as well as Steam games such as *Lumo*, *CS:GO* and *Blockstorm*. We also tried several less demanding titles from the Windows 10 App Store.

	Hannspree Micro PC	Archos PC Stick	Lenovo Ideacentre Stick 300	Intel Compute Stick	Asus Chromebit CS10	MeeGoPad T02
Price	£80	£77	£130	£125	£90	£60
Dimensions	110 x 38 x 9.8mm	113 x 37.6 x 18mm	100 x 38 x 15mm	113 x 38 x 12mm	123 x 31 x 17mm	115 x 54 x 10mm
Weight	38g	60g	50g	95g	75g	55g
CPU	Intel Atom Z3735F 1.83GHz	Intel Atom Z3735F 1.33GHz	Intel Atom Z3735F 1.33GHz	Atom x5-z8300 1.44GHz	Rockchip quad-core RK3288C 1.8GHz	Intel Atom Z3735F 1.33GHz
Memory	2GB	2GB	2GB	2GB	2GB	2GB
Storage	32GB	32GB	32GB	32GB	16GB	32GB
OS	Windows 8.1	Windows 10 32-bit Home	Windows 10 32-bit Home	Windows 10 64-bit Home	Chrome OS	Windows 10 32-bit Home/Ubuntu
USB Ports	1 x USB 2.0	1 x USB 2.0, 1 x micro-USB	1 x USB 2.0	1 x USB 2.0, 1 x USB 3.0	1 x USB 2.0	2 x USB 2.0



Internet Criminals

Causing mischief is what these guys are all about...

1 Kim Dotcom

Born Kim Schmitz, this Finnish and German internet entrepreneur has made millions from founding online services like Megaupload and, later, Mega. Of course, both of these are closely linked with copyright infringement, and this, along with accusations of money laundering, wire fraud and racketeering, is why the US Department of Justice is trying to have him extradited from New Zealand, where he currently lives.

But his rap sheet doesn't end there. He was already given a two-year suspended sentence in Germany for a variety of computer-related crimes. Later, he was given another suspended sentence for embezzlement, and he was also fined for failing to disclose shareholdings.

In short, he's a very naughty boy.

2 Dread Pirate Roberts

Taking his online handle, Dread Pirate Roberts, from the book *The Princess Bride* (or more likely the 1987 film adaptation), Ross William Ulbricht must have thought he was unstoppable when he was heading up the Silk Road black market website. Running on the darknet, Ulbricht's anonymity must have seemed assured, but just two years after the site's 2011 launch, Silk Road had been shut down, and Ulbricht found himself being arrested and charged with money laundering, computer hacking and conspiracy to traffic narcotics. By 2015, he had been convicted of those crimes and sentenced to life in prison without parole.

Unfortunately for him, his troubles haven't ended yet. He's still facing a separate trial in Maryland, USA, for hiring a contract killer to do away with six people (a witness, a blackmailer and associates of the blackmailer). Tut, tut.



▲ *Loving his new work placement, apart from the poor canteen food and the bright orange jumpsuit*

3 Gary McKinnon

Accused of carrying out the biggest hack of all time of military computers, Gary McKinnon worked his way into the systems of none other than Nasa (among others). The matter of his guilt is without doubt, because he himself has admitted to the hack. The problem, as you'll no doubt remember, is whether he should be extradited to the United States to face justice.

On the face of it, yes, he should, even if he really was just looking for evidence of UFOs and free-energy suppression, as he claims. But because he was diagnosed as autistic, he was declared a suicide risk, so it was claimed extradition would contravene his human rights.

Ultimately, the extradition was granted but eventually blocked by Home Secretary Theresa May. That, at the moment, is how things stand.

4 Gottfrid Svartholm

Along with Fredrik Neij and Peter Sunde, Svartholm co-founded The Pirate Bay. He was, of course, convicted of copyright infringement, for which he received a one-year prison sentence. But his illegal activities extend beyond this, and he's served a few sentences for other crimes too.

In 2013, he was given two years (reduced to one on appeal) for hacking into Logica, a company that was working for tax authorities. After that, he was sent to Denmark to face trial for hacking into computers owned by technology firm CSC. There he was handed a sentence for three and a half years.

He has, however, been free since September 2015, so he's clearly been behaving himself in prison.

5 Sabu

In 2011, LulzSec was a big deal. This hacker group had carried out a huge attack on Sony and apparently taken down the CIA website, among other high-profile attacks. At the heart of this collective was a hacker going by the name of Sabu.

The real identity of this person was revealed in 2012 as Hector Xavier Monsegur, but authorities were aware of his identity long before then. In fact, he had been arrested in June 2011 and had been working with the FBI ever since, continuing his LulzSec activities and helping to build a case against his fellow hackers.

We can't really blame him for that, but we don't imagine many of his old chums will be sending him Christmas cards any time soon. **mm**



A Guide To Social Media Buffer Apps

If you're a heavy user of social networks, either personally or for business, these apps could be indispensable

Who would have thought that social media would become a viable business tool, and even a profession? Yes, in this modern world of constant communication and always-in-touch-with-everyone-at-all-times culture, the ability to use social media tools like Facebook and Twitter is not just a socially expected skill, but it's also an important skill, even to the point where some employers will actively look for it in a potential employee.

This is best demonstrated by marketing and advertising companies, which have embraced social media with gusto, realising the huge benefits the new avenue of potential coverage. Even firms not concerned with marketing, as such, utilise social media for various reasons. Then you have the self-employed social media pros, such as online personalities on YouTube, successful bloggers, and other people who have made a business online, with social media residing at the centre of it all.

Social media isn't just for the professional, of course, and everyday users make up the majority of traffic here, with millions upon millions of posts being placed online constantly. The amount

of traffic social media generates is incredible, and all of this relies on people logging on and manually posting their thoughts, experiences, and other content.

In our busy lifestyles, however, it's not always easy to keep on top of social media posts, and for business users, it can be difficult to keep the tempo going, especially in fast moving social spaces like Twitter. What's needed is an aid that can help with this posting, taking some of the heat from the user and automating tasks to some degree.

Enter the social media management app. This breed of software is designed to augment social media use, taking some of the strain out of being constantly plugged into the world, and we're going to look at this topic here, as well as casting our eyes over a selection of some possible applications you may want to check out.

Socially Automated

Social media management applications are mainly designed for heavy social media users, the kind of people who post a lot, and often have to post at specific times. With this in mind, one of the main features of any social management tool is the ability to schedule posts, which are then posted for you by the program at a specified time. This has obvious benefits for marketing, but can be very useful for consumer use too, such as family announcements.

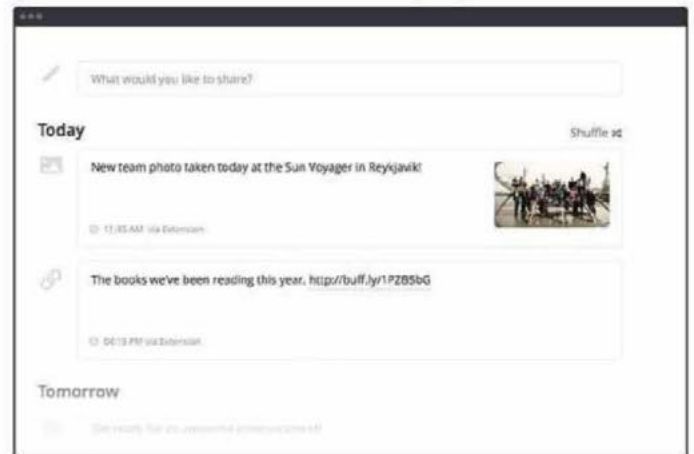
“ Not all programs are equal. Applications of this type have different features, and focus on specific user types ”

This scheduling often extends past simple timings of certain posts, and using one of these tools you can write a collection of posts in one go and have the program post them to social media over a period of time. So, if you need to keep a social presence, but don't have time to be online every day, you can let the program keep you active, even when you're busy with other things. Posts can be automatically staggered throughout a month, giving the illusion that you're online. A very useful tool for maintaining your profile.

Another common feature is the ability to bridge the gaps between social media. Most management apps support all of the major social networks, and can post to, and interface with all of them. So, whether you need to post to Facebook, Twitter, LinkedIn, or Pinterest, a single management app will let you do this, instead of having to use each social media's own tools or websites. That's a benefit for any user who uses multiple networks.

Posting images is an important aspect of social media, be it for business or the spreading of memes and jokes. Management tools offer functions that also deal with images, and lets users not only post images via the program, but also create and manipulate them before posting. Some apps also provide analytics, which are very useful for users who need to keep tabs on trends and what content is popular.

These are just some of the basic features you'll find in most software of this type, as well as support for multiple platforms, including mobile devices, which are arguably the most important to support given the nature of social media and its massive popularity on mobile devices.



▲ Buffer is popular, although to get the most out of it you need to pay



▲ Hootsuite is a business-centric app, but offers very powerful functions

Of course, not all programs are equal. Applications of this type have different features, and focus on specific user types, aiming for at either professional users or consumers. This means there are plenty of different tools out there, and you'll need to pick the correct app for you. Let's have a look at some.

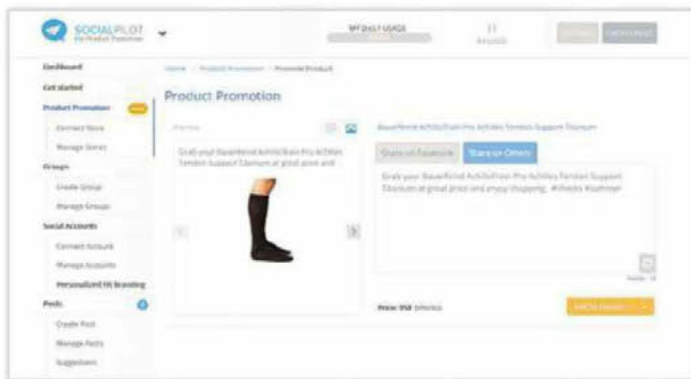
Management Ohm-ha Buffer (buffer.com)

Buffer is one of the most popular social media managers out there at the moment, and it's available in free and subscription forms. The free incarnation is for a single profile, whilst the paid for variant supports up to ten profiles per sub, with a greater number of posts in your 'buffer' (up to 100 instead of 10 for the free version).

The app itself offers all of the basics, which it does very well. It can schedule posts, upload images and video, will stagger posts over your chosen time period, and provides important analytics for your various social media accounts.

The social media supported includes Facebook, Twitter, LinkedIn, Google+ and Pinterest, and as well as use on a home computer, the service is also usable via mobile phone, with both iOS and Android apps available. There's also a business variant, which offers features more tailored to business use.

Buffer is a great service, but although it has a free option, it's more limited than others if you don't pay for a subscription. The most basic paid plan is \$10 per month, or \$102 per year. This isn't all that expensive, but when there are free options available, it may be steep for some.



▲ **SocialPilot** is another business-focused app, but it has more uses for smaller scale use too

Hootsuite (bit.ly/1T0YiGB)

Hootsuite is the other big name in the social media management world. Like Buffer, it's not entirely free. In fact, whereas Buffer has a free individual account option, Hootsuite has no gratis plans. This is mainly as it's not really designed for non-business users, and is instead aimed at small to large businesses, which would include users with a heavy presence on social media, and who use it for more than simply keeping in touch with friends and family.

The app is powerful, and it boasts all of the features users who depend on social media could want, including scheduling, analytics, and the ability to keep tabs on what others are saying. There are tools that can access client accounts if you represent multiple people on social media, and marketing tools help develop strategies and drives to push online presence.

As it's much more focused on the business and advertising side of things, Hootsuite isn't quite as fitting for individual use, even for online celebs, but it's certainly one of the most powerful in terms of drilling down to the fine details and pushing social presence into the public eye. It supports, Facebook, Twitter, Google+, YouTube, LinkedIn, Instagram, and Wordpress. If you're interested, there a 30 day trial available.

SocialPilot (socialpilot.co)

This is another management tool aimed at the larger scale user, specifically those with the need to manage multiple profiles – such as agencies, or simply users who operate more than one account for whatever reason. Along with the usual abilities such as scheduling posts and the like, SocialPilot particularly specialises in tying multiple profiles into one account. Think of it as the One Ring for social media, if you will.

It makes it easier to work with teams, or collaborate with others, and is able to focus on custom Facebook branding and the delivery of content under a specific banner. It also supports one of the largest ranges of social media portals, including Facebook, Twitter, LinkedIn, Instagram, Pinterest, Tumblr, Vk.com, and Xing. A mobile app is available for Android and iOS, and there's also a plug-in for Google Chrome, giving you access to your social media feeds and management tools at all times, something any professional social media user will require.

All of this is actually available for free, too. Though, admittedly that's in a limited form, of course. Up to three profiles can be connected to your SocialPilot account, with up to 10 posts per day and 30 in your scheduled queue. You'll also get some content discovery and suggestions.

The paid for version is pretty cheap, costing only \$4 per month or \$50 per year, and this gives you up to 10 connected



▲ **Kuku.io** is more simplistic in its approach to dealing with social media, and has a very easy to use interface

profiles, 50 posts per day, 250 scheduled posts in your queue, five RSS feeds and content discovery and suggestions. There are more expensive packages too, offering even more features.

Kuku.io (kuku.io)

Billed as "The World's most user-friendly social media management tool," **Kuku.io** is one of the more attractive social media apps. While it certainly has a very clean and simple interface, though that doesn't mean it's simple in terms of what it can do for you. Although it may not be quite as in-depth as some others, it still allows users to tie together all of their social media accounts so they can post content to multiple locations at once, and there are some useful analytics delivered to help track your effectiveness.

As with many of these apps, there is a focus on marketing, but as useful as it is in this regard, if you're a social media home user with a profile to keep up, such as a YouTube channel, for example, this is probably one of the better apps to use, inasmuch as it tends to scale down to let intensive needs a little easier than most.

Kuku.io supports Facebook, Twitter, Tumblr, OK.ru, VK, and Pinterest. It also has a limited free account, as well as subscription packages.



▲ **Jarvis** is a simple app, but one that's every bit as useful



▲ Socioboard is possibly the most powerful social media manager around

Jarvis (choosejarvis.com)

Jarvis is a smaller-scale management tool, and as such it's probably a very good option for a lot of home users, even though it's still designed as a marketing tool. It's free, and currently only supports Facebook and Twitter, with Instagram support on the horizon.

It's designed solely to keep your online presence alive and kicking, and can action posts for you using its set it and forget it approach. You input your posts into the tool, and it'll do the rest. It also has the option to re-use your most popular posts if your new content runs dry, so even if you're away for longer than you planned, it'll keep you covered.

Socioboard (www.socioboard.com)

Socioboard takes us back to the heavy-duty social media management tools designed for business and marketing. It comes in various modules, with the Socioboard 'Core' being the central pillar of the suite. It's this that provides the social media management, delivering scheduled posts, managing multiple accounts, delivering analytics, and generating reports.

BoardMe is a tool for creating your own collection of social media boards and content, with the option to stream them to other devices. BrandBuzz is a marketing-centric tool for communication with team members and customers. BrandHit is designed to help you reach more viewers and subscribers by networking with other people.

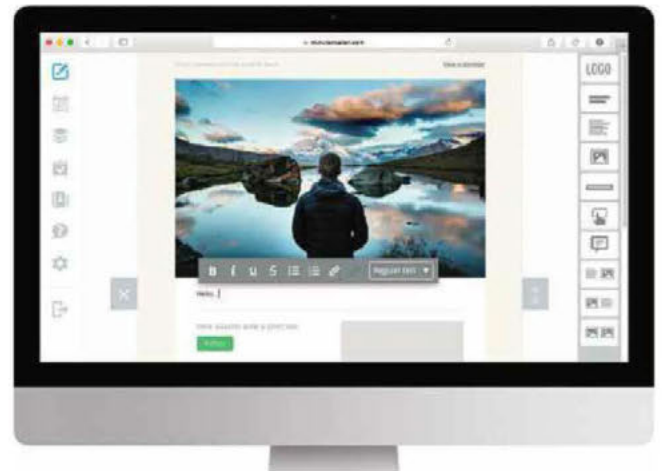
We'd say that Socioboard is arguably the most powerful social media management application, and it features a wealth of features not found in other similar tools. For many, it'll be straight up overkill, but if you're looking for a truly powerful tool that can help you dominate the social space, this is probably one of the best options.

Socioboard supports Facebook, Twitter, YouTube, LinkedIn, Instagram and more, and it's open source and cross platform, including Linux support. There's a free, basic plan, as well as a number of subscription-based options.

Minutemailer (minutemailer.com/en)

Guess what the Minutemailer social media tool is designed for? Yes, you guessed it, marketing. There's a definite pattern here, but don't be put off as marketing yourself is very similar to a product if you're trying to get your online personality off the ground. Minutemailer is another tool that aims to make social media management easier in terms of actual use, and it features a well-designed interface and tool set.

The main feature of the tool, alongside the standard social media manager tasks, is the creation of newsletters, emails, and



▲ Minutemailer is designed to create and share newsletters and mail content

other unique content, all of which can be shared to social media. The templates used for these are mobile-friendly, and the editor is easy to use and flexible enough for some creative content creation. As well as this it features contact importing, unlimited image storage, and 256-bit encryption for security of your data.

There's a free account option, of course, as well as several subscriptions, and the social media support includes Facebook, Twitter, and LinkedIn.

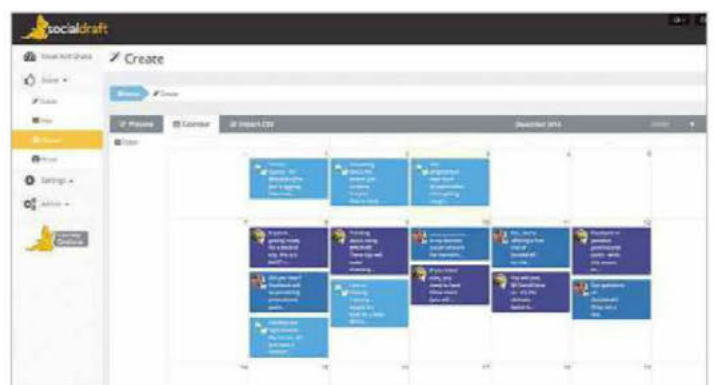
Socialdraft (socialdraft.com)

Our final example social media management tool is Socialdraft.

Once again it's a marketing tool, as most of these apps are given the obvious benefits of social media, and as such it features various tools to get the most out of your marketing strategies, be they for a product, company, or personality.

Along with social media scheduling, a core feature of any self-respecting tool of this type, Socialdraft has the ability to monitor review sites and other feedback, has a visual calendar, and can create special projects for managing your various accounts. It supports Facebook, Twitter, LinkedIn, Instagram, and mobile devices.

Oddly, unlike most other social media managers, Socialdraft doesn't have a free option outside of a free trial, and the cheapest option is a very expensive \$41 per month account (if you pay in one annual payment otherwise it's more expensive per month), with the most expensive costing \$104 per month. That's a lot of cash, and when so many other apps offer similar, or even better features cheaper, or even for free, you may easily be put off. As far as power and quality goes, though, Socialdraft is a top notch service, so you should think about the trial, just in case you like what you see and don't mind the price tag. **mm**



▲ Socialdraft is expensive, but it has a wide range of features to back up the cost



Things We've Stopped Doing On The PC

Mark Pickavance looks at a collection of once-common activities, which have now been all but abandoned

Being along for the ride, it's often difficult to appreciate the sheer amount of change that has occurred over the past 30 years or so. Larger storage, faster processors and better technology have all come along and rewritten the PC playbook, along with the internet.

Because of this, there are activities that many PC owners did that they no longer do – and I'm not just talking about loving the colour beige.

Do you remember doing any of these, or are there some you're sheepishly still doing?

Compressed Storage

About the time that Windows came along, there was a curious phase where the cost of storage and the size of drives got completely out of balance with what PC owners could actually afford. As people used their systems more and their collection of apps and data grew, they

rapidly discovered that the hard drive they'd bought just wasn't big enough.

Luckily, the power of the processors available at the time offered a potential solution in the form of compressed volumes, as first appeared with AddStor's SuperStor that came bundled with DR DOS 6.0.

The thinking behind these products was relatively simple but effective. A single large file was defined on the existing volume and then, via the app,



▲ *Stacker for OS/2: two things we don't do any longer for the price of one!*

bolted onto the OS as if it was another physical drive. Any data being placed in that container was automatically compressed and then uncompressed when it was required.

How well this generally worked was rather shocking, I recall. Often a document would load faster when it was in a compressed volume than from an uncompressed one.

The downside was that it was very difficult to work out how much extra space this would extract from the storage you had, because some data compressed better than others. Using zip files, for example, gained you nothing, as they really couldn't be compressed any more.

Where it really shined was with documents that by their very nature contained lots of repeated bytes or sequences, like those typically found in word processed content.

Pretty soon, everyone was using one of these compression tools, with the most popular being Stacker by Stac Electronics.

Disturbed by the popularity of this tool, Microsoft decided to put this functionality in MS-DOS 6.0 and developed 'DoubleSpace', which effectively did exactly what Stacker did. However, it later turned out that DoubleSpace infringed on two data compression patents that Stac owned, and litigation ensued. Eventually, Microsoft paid for this problem to go away – over \$80 million, all told.

Within a few years of this, the necessity for compressed volumes had passed, as drive capacities increased,



▲ *Where we're going we don't need cables!*

as did speeds, and the cost per megabyte dropped.

Ten years later, very few people were using compressed volumes, and those who needed that type of technology used operating systems with the functionality baked in, rather than as

one screen, so it needed to be connected to multiple machines.

Thinking about it logically, surely it would have been better to put more than one input on a monitor? But the KVM came along, and by twisting a physical dial you could direct a keyboard,

“ Pretty soon, everyone was using one of these compression tools, with the most popular being Stacker by Stac Electronics ”

an additional app. The last version of Windows to include it was Windows 98 SE, which had DriveSpace 3.

But drive compression generally was a very popular solution that most PC owners in the 90s used, but it failed to stand the technological test of time.

Use KVMs

They still sell KVMs (keyboard video mouse) hardware, so is my contention that this is a thing of the past valid?

It is, because the entire point of the KVM originally was to allow one monitor and one keyboard to be used to control multiple machines, and these days there are much better ways to do this than some horrific rats-nest wiring solution.

My first experience with a KVM was in the control of servers, where in the machine room there was only room for

display and later mouse, to initially a couple of machines.

There were however multiple problems with these devices, which made them less than a joy to operate – not least the amount of cabling that came with them. For each machine on the KVM there were at least three cables, and the VGA line was also rather thick and inflexible. As these boxes progressed from two, to three and even more supported machines, the number of cables and the complexity of the wiring inside became exponentially greater.

But that wasn't the only problem, because the PC was never designed to have its keyboard disconnected and reconnected while it was running. The keyboard has a processor that's powered from the PC, and it's initialised when it's first turned on. Having it reset repeatedly



▲ Fax technology, like advertising like this, is hopefully a thing of the past

could lead to problems, loss of connection and spurious key sequences being sent to the attached system.

The solution to this was an electrically active KVM that kept the keyboard powered and thinking it was attached to a PC while its physical connections were redirected.

These improvements helped, but the other problem was that there was still a practical limit as to how many machines you could manage using one.

What really spelled the end of the KVM were two things: USB and remote desktop.

USB by its very nature doesn't like to have two or more masters, so that didn't work well in a KVM context. But also with the advent of remote desktop tools, the necessity for IT staff to actually visit the machine room to make server adjustments diminished. They could make the same changes from their own PC and do it for as many servers as they needed.

For those changes that needed a physical presence, USB mice and keyboards are built to be attached (and detached) at any time, and screens these days can have multiple inputs.

I'm sure there are plenty of people still using KVMs, but in reality they're unreliable and overly complicated accessories that need to be consigned to history.

Fax

Before the letters page goes crazy with people declaring themselves as fax fans, I'll point out that I'm just the messenger, so don't shoot me.

Originally called telefacsimile, this technology was referred to as fax once it became popular with business in the late 70s. But the concept of sending images using a telephone line dates back to the 1920s.

These machines became the darlings of the print industry and enabled newspapers around the world to put pictures on their cover stories from around the world within hours of those breaking events.

The breakthrough for the fax came in the 60s when Xerox developed a machine that was small enough to transport easily, and a decade later they started to invade offices all over the world.

“ If everything user accessible is in a single partition, then that just isn't necessary ”

After early analogue standards, eventually digital ones came along that took their cues from the speed increases that dial-up modems experienced.

In the ultimate incarnation, they used ISDN to achieve about 8KB/s transfer speed, though both ends needed ISDN to achieve this.

The problem with the fax was that it tied up an entire telephone line at both ends to send a poor-quality representation, usually in mono, and it took an age to do it.

Given the amazing technology we have these days, how is this still a thing? I've heard numerous arguments about why the fax still exists, most of which are utter rubbish when you analyse them. One is that businesses have confidence that a faxed message will always get through, whereas an email could easily be overlooked or deleted.

Much of this confidence seems to stem from the receipt that the system appears to give you that the fax was received at the other end, ignoring the reality that at that point there is no guarantee that the fax was actually printed. Failure to have available paper or toner/ink and the ability for the memory to be easily reset undermine that argument further.

Also, because of the lack of effective error checking, the sender has no idea if the critical information on the sent document made it over the transmission

or even if an omission would be noticed by the recipient.

When you compare this with an email, where the contents are identical on arrival to how they were sent, the fax seems terribly ineffective.

There is only one situation where the fax still has sway, and that's in a legal context. As silly as this is, in many countries, electronic signatures on contracts are not yet recognised by law, while faxed contracts with copies of signatures are.

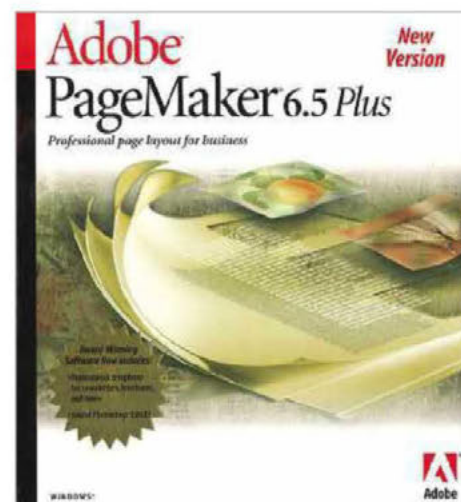
This scenario is purely about the inability of the legal framework to address the changes of technology in a reasonable time, rather than a validation of a fax

as being in any way superior to a dozen other methods of identity confirmation.

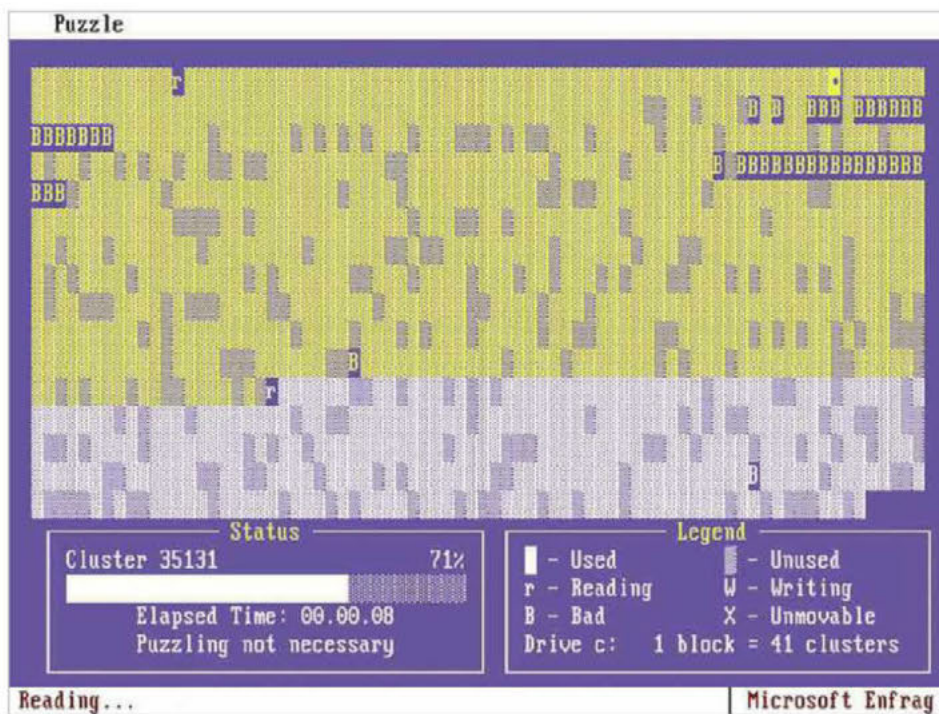
Unless you're a lawyer or Japanese, if you're still using fax technology with the excuse that 'it's a technology I understand', then you really need to retire, along with your fax machine.

Desktop Publishing

In the 80s, probably the coolest thing you could do with a computer was to desktop publish with it. Only a few years before, producing typeset output was something only union approved experts were capable of, and then everyone got to try by simply installing software.



▲ Adobe Pagemaker was once something that everyone wanted, until they didn't



▲ In the days of MS-DOS, defrag was one of the tools that told you that your hard drive was dying, when lots of bad blocks started to appear

This did, however, miss the point somewhat that the real skill of typesetting was not throwing words at a page or using as many fonts as the system came with.

So for at least a decade, many people produced unreadable newssheets and posters and wrestled with the demons of hyphenation-justification tables, while the likes of Adobe and Quark made an absolute mint out of them.

And then, probably not before time, our interest in killing trees just to see our own page composition skills in action waned and the market for desktop publishing tools dried up.

Yes, there are some, like those who put together this publication, who use QuarkXpress or Adobe InDesign, but for the majority of people these are tools they'll never own or even aspire to have.

At school, you might encounter Microsoft Publisher, but many people can as easily make Microsoft Word produce very similar results if they need to create a pamphlet or poster.

QuarkExpress for the PC costs around £1,000, so it isn't an application that many people would invest in on the odd chance that they might need to publish something.

I haven't had a desktop publishing application on my work PC since the Pentium II was popular, which tells you just how beyond that era we really are.

Defragmenting

Did you ever defragment your drives? Most people did at some point, because otherwise your system would become really sluggish and temperamental whenever you went to write a big file.

That's because if the file can't be written in successive disk sectors, then it ends up in little pieces all over the disk, making both the write slower and the retrieval of the data later.

But actually when I think back, defragging was also about what happens when you use 90% (or more) of a hard drive and the writing and reading of files becomes highly inefficient.

Since then, there has been a multi-pronged approach to solving fragmentation that's all but eliminated the need for defragging.

For starters, far fewer people run their systems anywhere near full, but also the operating systems try to be more organised when writing data, to reduce the build-up of fragmented layouts. Having more RAM to pre-organise data before its written has helped, and also the cache space on the drives is also another buffer to aid this process.

All these developments helped minimise the impact of fragmentation and the necessity to run a defrag.

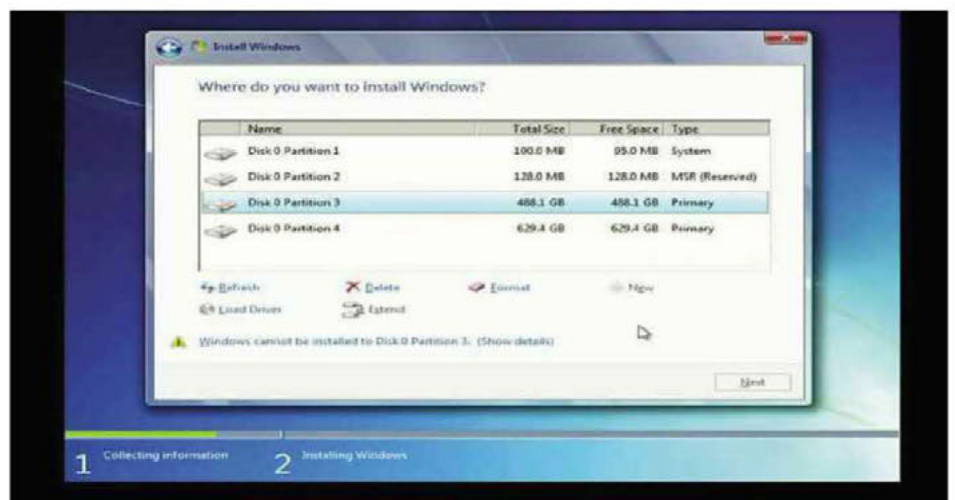
On most modern systems, the defrag tool is now entirely redundant, because they use SSDs that don't have moving parts. It takes no longer to write or read data to an SSD in a fragmented or contiguous space, because there are no spinning disks or moving heads.

What's much more important on these devices is that they write evenly to the whole capacity, not repeatedly favouring one location over another.

What's slightly curious about this is that in Windows the defragmentation tool is still available for drives the system knows are SSDs, even if running it achieves nothing.

Actually, it's worse than nothing, because rewriting gigabytes of data into sequential blocks actually reduces the life of your drive for no appreciable benefit.

If you have an SSD and defrag, please stop! And those with hard drives, make sure you really need to do this before starting, as it can take an age on a high-capacity drive.



▲ These days, Windows does its own thing in respect of partitions, so why would you want to mess with that?

Partitioning Hard Drives

When I first got into computersm 'Winchester' drives didn't really exist for the home user, though they arrived soon enough once we'd fully exploited the humble floppy disk.

The first hard drive I owned was a 30MB (not a typo, 30MB!) Megafire for my Atari ST, and even with that little space on it, I partitioned it!

Why? Because the TOS operating system it used was a derivative of CP/M-68K, so it could only address a 16MB partition.

As systems evolved through the 80s and 90s, this was a problem that was stumbled into numerous times. FAT16 could only handle 32MB initially. That grew to 2GB before FAT32 came along and supported 16TB partitions but only

everything in a single partition and directory structure, with sub directories as the only segmenting control. Even with Windows 10, it never actually moved away from this model, and organising a Windows system to use different partitions for system, apps and data is really challenging for those who insist on doing that.

The problem with doing that is that by dividing up a drive into multiple partitions, you're assuming that you know exactly how much of each you're likely to occupy, and rarely are people that accurate.

If you run out of space in the App partition but have plenty in the data area, then you'll need to resize the partitions to move unused space around.

There are plenty of apps for adjusting partitions, and Windows itself has many of facilities to grow, shrink and even span them over multiple drives. But frankly, most people would probably like to spend time using their computers than reorganising them at a partition level these days.

Connecting Printers Directly

For older readers, I'm going to use a rude word that only they would understand. Centronics! There, I said it. Early printers used either entirely proprietary connection methods or the dreaded RS232 serial interface, and then parallel printing came along with the Centronics connector.

This was a really horrible thing that wasn't sufficiently standardised and gave many IT people headaches through its abysmal level of reliability.

Based in a bi-directional parallel communication interface developed by Centronics in the 1970s, it later became IEEE 1284, but it still had 36 pins on an overly complicated cable and only worked when it was in the mood.

What was really scary about this technology was that people actually started using it for other things, like scanners and even tape backup drives, because every PC had one.

As PC technology spread into businesses, they often whined about the cost of buying a printer for every PC and those abysmal cables to connect them. So in a very similar fashion to KVM hardware, office suppliers started offering Centronics switch boxes, so a printer could be easily connected to more than one computer. The number of wires in these was tremendous, even if they only switched between two computers. Ones that could handle more machines must have looked like early Bletchley Park experiments internally.

“ Placing computers on desks was an inherently silly idea, and once people realised that, it soon went away ”

4GB (minus one byte) for the maximum file size.

But even under FAT32 people were often encouraged to take a single hard drive and split it into logical volumes, so they could run more efficient naming tables and also learn to keep the OS and data separate.

Part of this was to do with academic notions of organisation and also the influence of Unix on early computing, where symbolic links allow you to distribute parts of the file system around different drives.

However, if you look at what Microsoft did with MS-DOS and then Windows, you'll see it ignored all this and put

If everything user accessible is in a single partition, then that just isn't necessary.

The only solid argument these days for partitioning is if you wish to isolate multiple operating systems from each other, as in dual-booting. By giving each OS its own partition, you can hopefully stop them making changes that others wouldn't care for on their file structures.

But we're talking about very technical things here that the average user wouldn't understand or want to. And even those who are technical have better things to do than mess with the partitioning of their drives when just letting their operating system allocate space logically works 99% of the time.



With so many connections, this generally unreliable technology didn't get any more robust by doing this with it.

Thankfully, USB came along eventually to save us from Centronics, but this was still promoting the idea of one PC equals one printer.

And then wi-fi came along, and while it only appeared on the most expensive printers first, soon it was on even the cheapest. Today HP's Envy 4502 Wireless e-All-in-One Inkjet costs less than £30 and it has a means to operate without ever being physically connected to the PC that's using it. This frees you up to put the printer where it best suits you and not on your desk next to your computer. Unless you have a PC with no wi-fi or no access to a wi-fi router, then there's no need to connect your printer to your computer directly.

For those with printers that predate the wired/wireless network revolution, there are now devices you can purchase that add this functionality locally to them.

The era of wiring up printers to computers is behind us, and the only reason for doing it is to avoid configuring the wi-fi properly.

Using Screensavers

A decade ago, if you went into an open-plan office at lunchtime, all you'd see was screensavers running. Often they'd be the ones that came by default with Windows, but occasionally you'd see ones people had installed themselves, like the fish tank.

These appeared in response to problems that happened with CRT monitors, where if they got left on the same thing for prolonged periods of time they'd permanently burn that image into the screen.

Logically, you'd think that it would be better to have a blank screen and the monitor in power saving mode, but CRTs didn't fire up immediately, so moving images were generally the approved solution.

However, modern LCD monitors don't suffer with these problems, and people still run screensavers on them. Why? Well, it does tell you that the computer is on, if you can't see the power light, but other than that, it doesn't serve much purpose.

It's much better for the person paying the electricity bill that they go into power saving mode, and that's the default that Windows uses.



While custom backgrounds are still popular, the notion of a screensaver is one we've moved beyond.

Those who are using them almost certainly aren't saving their screen or their pocket, even if they can be a pleasant distraction.

Placing PCs On Desks

I've thought quite hard about this, and I've come to the conclusion that this all started with systems like the Commodore Pet, where the monitor and system were all in the same box.

The Apple Mac was the same, though the IBM PC did have the screen and system box as separate items. However, to use the PC, you needed to access the floppy drive slots, and the monitor needed a plinth to raise it up to a decent working height.

The idea that the computer would occupy your desk space also seemed to represent the notion that you didn't need that work area for papers, because you had a computer.

The reality was that many offices ended up buying extra workstation furniture so the desk wasn't occupied by the PC, ironically. This model of the computer with a screen on top went on for a significant number of years, and systems like the iconic Amstrad PCW512 reinforced this notion.

It wasn't until the 90s that floor standing systems started to become

more popular, and people started to re-establish control of their desk space, with floating support arms for their displays and keyboards.

The only computers that are generally placed on the desk are those like nettop systems that are inherently small, or if there isn't any leg space to put that underneath. Most powerful desktop systems are far too large to go on a desk, and they're not designed to be placed in any other orientation than standing up.

Placing computers on desks was an inherently silly idea and once people realised that, it soon went away.

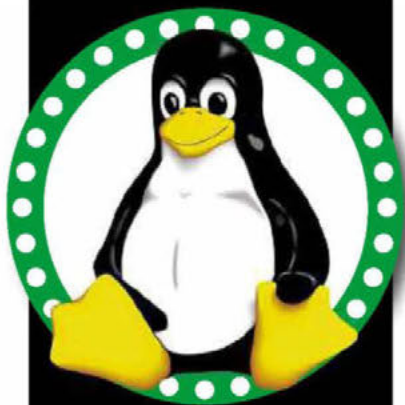
Final Thoughts

I'm sure some of you reading this will be doing some of the things I've just mentioned, but generally they're things of the past.

What we can take from this is that things we do now, like looking at screens or using keyboards will, in time, become something people once did on computers.

It's an evolution, and everything we do turns into a historical footnote eventually. Just because we hang grimly on to concepts and structures that we can relate to, that doesn't preserve them for the next generation in perpetuity.

All systems are the now, coloured with the past, with just an exciting hint of the future, and that's as it should be. [mm](#)



David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

A Steam Powered PS4?

Where there's Linux, there's Steam

A few months back we reported on how a group of hackers had finally managed to circumvent the protection on a PlayStation 4 and install a version of Linux, thus allowing the PS4 to boot to a desktop and run a collection of meagre Linux titles.

In the ensuing months things have improved somewhat, and one particular user has managed to trump the original hacking group and brought the Steam Client under Linux to the PS4.

OsirisX, the user in question, posted a YouTube video and some information on the Wololo Forum, whereby he/she managed to install Arch Linux, as well as both the 32- and 64-bit patched Radeon libraries from the original hacker group fail0verflow.

The end result is not exactly spectacular, involving an incredibly slow boot process, followed by the user running the Steam Client in Big Picture Mode. What's interesting here, though, is that Steam actually recognises the hardware as an AMD 1.6GHz eight-core and eight-thread system, with an available 7.3GB of memory, and an AMD Liverpool GPU.

Purely from a curiosity point of view, it's certainly a heck of an achievement, and the user OsirisX goes on to play *Bastion* from their Linux Steam Library, which incidentally works quite well from what's displayed in the video.

Next-gen Console?

I suppose it's hardly surprising that it should work, really. After all, the new generation of consoles – both the PS4 and the Xbox One – are little more than glorified PCs. Although it's a worthy project to manage to crack, there are some voices out there who use this as a stick with which to poke the modern console.

"This gives us even further proof that consoles are nothing but an underpowered PC. While it's cool to see Linux working on PS4 hardware, this must be the least practical thing I saw in a while now." One user commented. Another said: "So what? You gonna go through all this trouble to install Linux, possibly risking your console getting banned or, even worse, bricked, to play old PC and indie games at low-medium settings with unstable frame rates?"

Reasonable comments, in a way, as to actually get Linux installed you'll need to use an older firmware for the PS4,

and there is the risk that you may indeed end up having an expensive lump of useless plastic instead of the world's most powerful console in your hands.

Furthermore, the example used in the demo, *Bastion*, isn't exactly a game that stretches the hardware; this is a game that can be run in a Chrome browser on a PC with 2GB of memory, a 512MB GPU and a 1GHz CPU.

For The Craic

While there's a fair amount of negativity associated with the project, what many people don't seem to be seeing is that this is simply an experiment. It's a bit of fun, to stretch the skills of a group of enthusiasts to see if they can warp one system to run another OS.

True, there may well be copyright repercussions in the future, but for now let's just enjoy the fact that Linux and Steam can be run on a PS4.

▼ *Running Linux and the Steam Client on a PS4, whatever next?*



Shadow Of The Beast

The Amiga seller rebooted, Sven Harvey takes a look!

DETAILS

- Price: £12
- Website: store.playstation.com
- Required Spec: Sony PlayStation 4

Reflections (as eaten by Ubisoft) developed *Shadow Of The Beast*, which was released by Psygnosis (as eaten by Sony) in 1989. Its main strengths – wonderful music and eye-popping graphics – were an utter revelation and sold many machines. It was released in an oversized box (even for the time) that also included a tee-shirt and was adorned by Psygnosis' signature style and Roger Dean artwork, at a then-unheard-of £35.

This new version has clearly been crafted by people who loved the original, and even Martin Edmondson from the original team gave the new version his blessing. The team at Heavy Spectrum have worked wonders to get this game as polished as it is, together with XDEV (surely they should be named Psygnosis). Polish, however, was never an issue for *Beast*... the gameplay was the problem. Yes, it was massively difficult, but the original games' real Achilles' heel was the overall playability. The same cannot be said of the 2016 game, though.

Starting off in the grasslands, you guide a still tethered Aarbron as he hacks and slashes his way through waves of enemies (and not-so-much-enemies) with his claws. Once free of the will of his captor and corruptor, Maletoth, the quest starts properly (I'll not give away too much about the reimaged storyline, though).

The landscapes of Karamoon are gorgeously rendered and, though the gameplay is – in the main – 2D, the use of special timed attacks and combos raises it above your average brawler. Its 'Rage Chain' system also allows you, with appropriate timing, to take on foes coming from in front and below with ease; mind you, a blood powered gun helps you take on a very Hydra-like level boss, so it's not all hand-to-hand combat. I am not sure whether the gameplay would be enough to be 2016 release – but then, this isn't selling for £60!

With tons of content to unlock with the gained in-game currency (including the full original Amiga game, and a version of the Amiga game with invincibility as well), there's plenty here for your £12. The depth of the story makes it more of an experience. I could see Sony turning this into a film given half a chance. However, like the original, it's the

sound design that really draws you in.

The game has all the good bits from the original release – the style of the graphics, the music – and echoes of the original punctuate throughout whole package. This, however, is exactly what a 21st century reboot of an Amiga game should be. The gameplay is much improved, and puts it firmly in my top three games on the PS4... And, potentially more importantly my son agrees! It's just a shame it wasn't released on disc, in an oversized box with a tee shirt and a CD – I'd have happily handed over £35 for that!



The Soundtrack

The PlayStation store also offers the game soundtrack at £6.49, which includes not only the music from the new version of the game, but also recordings of the original Amiga game music, which is a nice bonus (though you can play the original game music from within the main game in the extras menus).

The soundtrack is in a wrapper program that installs on the PS4, but allows you to plug in a USB stick to export the music as MP3s to play on other equipment.

Suffice to say I always loved the music from all three original *Beast* games, and though the music as originally presented in the trailers didn't enamour me, the final music in the game did... So the soundtrack got bought, as I can't envisage it ever turning up on CD.



Sven Harvey has been our Amiga specialist for over 16 years, drawing on his 25 years retailing computer and video games and even longer writing about them

Amiga



Ian McGurren is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

I/O, I/O, It's Off To Work We Go!

Ian McGurren looks at more goodies to come out of Google I/O 2016

Last week I looked at three interesting developments in the Android world, revealed by Google at their recent I/O annual event – their new messaging apps Allo and Duo, Android Instant Apps – the apps that run without installing and the as-yet-unnamed next generation Google Assistant complete with even more eerie prediction and artificial intelligence. It's this next generation assistant that is at the heart of the first of this week's items, the vaguely named Google Home.

Google Home

It's not quite *Demon Seed* just yet (or *Treehouse Of Horror* with Pierce Brosnan, depending on your frame of reference), and Google hasn't made an actual home – at least not yet. No, Google Home is a piece of hardware based on the Chromecast OS (not Android) that is actually closer to Amazon's Echo, the voice-commanded personal assistant-cum-wireless-speaker the retail giant revealed last year. So, imagine a wireless speaker that you can also use to call up your Google Assistant. At first that might sound a bit pointless, but think of the times you check your phone for messages, appointments, email and more – all can be passed over to the assistant for you to check at your leisure while getting on with other important things, like feeding yourself.

Taking it further, there's integration with smart home devices (yes, your Google Home could tell your smart fridge not to open because you've already eaten too much that day... brilliant) and, in the future, even smart clothes. Talking of which...

Project Jacquard

As the title might have hinted, this is Google's pet smart clothing project, in collaboration with Levi Strauss. So far it's for relatively simple wearable tech, so items of clothing that respond to touch, allowing control of devices without touching them physically – think a coat that allows you to skip tracks by brushing your arm one way or another. The tech is based on superconductive fabric and communicates via a low power wi-fi connection, and currently the tech isn't quite fabric-sized, more button-sized, but we could be seeing a future where our clothes are only too happy to let us know when we're a bit wider round the waist than we were the week before.

Daydream VR

Finally, it's one of Google's bigger announcements of the event, Daydream VR. Google is no stranger to VR, with its Cardboard project being one of the most fun things you can do with a smartphone for around £10. Daydream VR, however, is not Cardboard, it's a real, fully featured VR platform for Android.

Like other projects, it has a reference design, so devices that comply with that standard should be able to run the Daydream software like it runs any other software. There is a hardware element to it, not too far removed from the headset available for Samsung devices – which itself is much cheaper than, say, the HTC Vive or Oculus Rift.

Realistically, this could well be the cheapest way to get into 'proper' VR, and with the exponential growth in phone hardware power showing no signs of stopping, in a few years it might even rival those top-end systems and still be in your pocket.



Nvidia Helps Set Filters To Stun



Nvidia and the University of Freiburg have created a smartphone filter that is worth having, says Andrew Unsworth

As much I appreciate the ability to take photos and videos of events and everyday life with my phone, I've never been one to share them reflexively on social media. I have nothing against those who do, but I'd rather catch the spontaneity of something happening and not have to ask my mates to "do that again" until they've got it looking just right for Facebook or Instagram. If I'm setting up a shot on purpose then a bit of planning and setup is a good idea, but if it's something that's happening on a night out then I want it to look natural and uncontrived.

As a consequence I've never really played around with the filters on social media sites. This goes back to wanting a natural and realistic log of occasions and my life. For me, introducing filters on a non-arty shot carries too much risk of introducing false memories, even if the falsehood is simply the lighting. I know I probably sound like a luddite on this, but I have enough trouble remembering if a memory is real and not a particularly vivid dream remembered from childhood as it is. I'd like to say this is an age thing, but my beloved wife is always uploading filtered images to social media sites, and we're of a similar vintage.

However, I've found one filter-type that I do like the look of, and that's a filter that applies the artistic style used in a piece of art to a video or photograph. The filter has been developed by researchers at the University

of Freiburg and more details of it can be on the Nvidia website (tinyurl.com/zss6mxt).

The team at the University of Freiburg have developed a technique that employs a form of artificial intelligence to study the artistic style of one image and apply the style to another image or video. The story appears on Nvidia's website because the researchers use Nvidia GeForce GTX Titan X graphical processing units to accelerate the computation required to apply the filter to a video. Nvidia says "artistic style transfer takes eight to 10 minutes a frame for a high-resolution video. That's 20x faster than with a multi-core CPU." That certainly is impressive – although, as Nvidia's blog states, it'll be a while until we have the ability to apply this technique to video in real time.

A video demonstrating the technique ("Artistic style transfer for videos") can be seen on YouTube (tinyurl.com/hhbfzsj), and the results look amazing. There are clips of various films including *Star Wars*, *Cloud Atlas* and *The Jungle Book* among others, and the video shows how these clips

appear with and without the filter applied. The video is well worth a watch.

This work ably demonstrates the power of the GPU in computer science and software engineering. As lay geeks, the graphics cards in our PCs are mostly used for gaming or playing YouTube videos. While most AAA games require very high-end cards to deliver the kind of graphical fidelity advertised and desired, the many day-to-day tasks we undertake do seem to be wasted on our GPUs.

Thankfully, the ability to unlock the computational power of the GPU is not confined to the laboratory. It's been possible to use the CUDA cores of Nvidia's graphics cards to perform tasks in Adobe Premiere Pro or After Effects for a while now, for example.

As computing becomes more distributed, and moves further away from the traditional PC model, we'll see greater use of GPUs and other non-x86 processors in everyday computing. This is pretty exciting, and I look forward to seeing more innovation in the next few years.



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner and his handshaking skills are second to none

Hardware



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

Gaming

Born To Be Wild

According to Ubisoft, the open world in *Ghost Recon Wildlands* will be its biggest yet – even bigger than *The Division's* Manhattan, it says. Yikes

This week, Ryan takes a look at Ubisoft's forthcoming tactical shooter *Ghost Recon Wildlands*, and checks out the indie marshal arts MMO, *Absolver*...

Plug & Play

Such was the marketing jamboree surrounding Ubisoft's most recent Tom Clancy-based game, *The Division*, we almost forgot about another major forthcoming game with the Clancy branding. *Ghost Recon Wildlands* was unveiled at E3 last year, where the first footage revealed that Ubisoft is pushing the tactical shooter franchise into open-world territory. Since then, the game seemed to quietly fade into the background somewhat – no doubt to avoid drawing the limelight away from Ubisoft's new IP, *The Division*. But with that game now released and generally considered to be a roaring success, *Ghost Recon Wildlands* has quietly re-emerged, as stealthily as one of its special ops soldiers.

Set in a present-day Bolivia where powerful drug cartels are rife, we're cast as one of a quartet of US military types whose job is to sever the drug barons' choke hold on power. Eschewing the high-tech weaponry of *Advanced Warfighter*, *Wildlands* returns to the grounded tactics and stealth of the original *Ghost Recon*, with planning and cooperation (whether it's between three other human players or a trio

of AI soldiers in solo mode) being the key to success. What distinguishes *Wildlands*, however, is the sheer range of options available when tackling each mission. When assaulting a drug baron's headquarters, for example, we'll be able to make all kinds of tactical decisions for ourselves: do we attack in broad daylight or when the sun sets? How and where you and your quartet of soldiers are deployed will also be entirely up to you. The latest trailer showcases some of the possibilities: parachuting from the sky in the dead of night. Roaring in via military helicopter, perhaps with 'Ride Of The Valkyries' playing on the stereo. Alternatively, you can have your troops dropped off miles from your destination and either pick your way there on foot or travel about using a range of vehicles available – bikes, jeeps, even speed boats if you're not afraid of getting your feet a bit wet.

Wildlands' coarse expanses inevitably recall the more recent entries of the *Far Cry* series, though it isn't yet clear whether the new *Ghost Recon* will share that game's survival elements. The special ops guys are shown dashing on foot through deserts and scrubland, but will all of

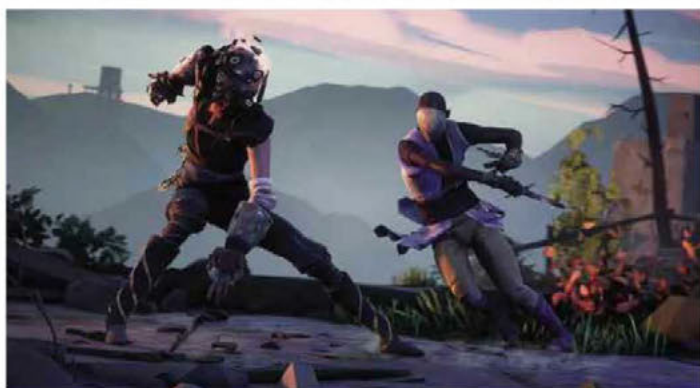
that running have an impact on their stamina once they finally reach their objective? Will acquiring food and water play a part? Ubisoft is particularly adept at creating beautiful-looking sandboxes – just look at the wintry Manhattan setting in *The Division*. But as that game proved, a realistic setting can sometimes clash with the artificiality of the game itself; *The Division's* hoodie-wearing enemies move realistically but can soak up a distracting amount of machine-gun fire at times.

The answers to these questions will probably start to surface in the coming months. Until then, *Wildlands* certainly looks promising and ambitiously huge.

Ghost Recon Wildlands is due out in March 2017.

Online

Think of the hand-to-hand combat in most MMOs, and things like nuance and subtlety probably won't spring to mind; it's generally more the case of choosing your weapon or spell of choice and repeatedly tapping a button. The forthcoming *Absolver* promises to be rather different, though – mainly because fighting is the game's main event rather than a means to an end.



▲ Looking for an MMO with a difference? Forthcoming online brawler *Absolver* will offer hand-to-hand combat, three-on-three battles and even a spot of dungeon looting

It's the debut from Paris-based studio Slocap, which was founded last year by a bunch of former Ubisoft employees (they list *Watchdogs* and the *Ghost Recon* games as projects they've worked on in the past).

Set in an unspoiled, mountainous world seemingly inspired by martial arts movies, the game casts the player as one of a masked band of elite fighters called the *Absolvers*, a group whose sacred task is to wander the lands and kick their enemies repeatedly in the face and neck. What this means, in gaming terms, is that players will roam *Absolver's* lush

landscape in search of potential opponents, though whether you choose to attack, befriend or maybe do a bit of trading with the other players you encounter online will, apparently, be entirely your choice. Assuming you're up for a fight, the game will offer a range of attacks, dodges and other moves, and you'll also be able to pick weapons and combat styles that best suit your style of play. *Absolver's* debut trailer reveals a range of swords, sticks and possibly even magic attacks, and it also looks as though we'll be able to customise our character with things like masks and hats.

As well as one-on-one combat, there'll be three-on-three battles and dungeons ripe for plundering. Depicted in a lush, cel-shaded style, *Absolver* looks refreshingly different from MMOs we've seen in the past. It's certainly a change of pace for Devolver Digital, a publisher that has, until now, brought us such small yet perfectly formed indie gems as *Hotline Miami*, *The Talos Principle* and the Japanese pigeon dating sim *Hatoful Boyfriend*.

Absolver clearly takes place on a larger canvas than those games, though what we've seen so far still displays a sense of hand-crafted individuality. Slocap should be revealing more from the game at this month's E3, and we're looking forward to finding out what else its leafy online world will contain.

You can find out more about *Absolver* at absolvergame.com.

Incoming

IO Interactive took a brave left-turn with its *Hitman* reboot, in that it opted to release the game in episodic chunks rather than as a traditional all-in-one product.

Thus far, the approach seems to have paid off, with the general response to the action-stealth sequel being far more warm than the widespread disappointment that greeted *Hitman Absolution*. And while some argued that *Hitman's* initial lack of content and overall refinement made it feel a little unfinished, the good news is that IO's episodic approach means that, for now at least, there's always another big mission on the horizon.

Released on 31st May, *Hitman's* third episode is available now and takes the ice-cold killer Agent 47 to the heat and bustle of Marrakesh. It's the largest map we've seen in the game so far; one of your major targets is a banker holed up in the city's Swedish embassy, but as in previous episodes, it's almost as much fun to wander around the map and discovering its secrets. Episode Three is a further reminder of just how much detail IO has put into its *Hitman* reboot. A further four episodes – Thailand, the US and Japan – are planned for release over the coming months. **mm**



▲ Agent 47 takes to Marrakesh for the third episode of IO's *Hitman* reboot. Packed with detail and things to discover, it may be the game's best map yet

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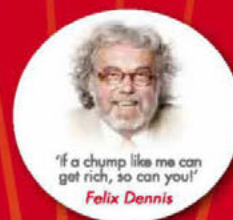
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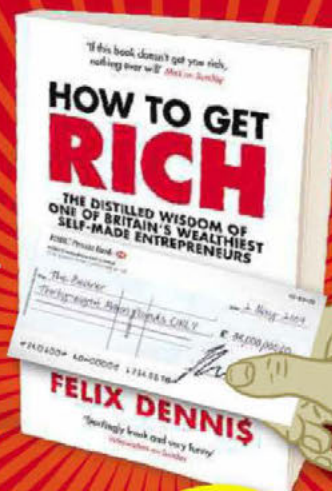
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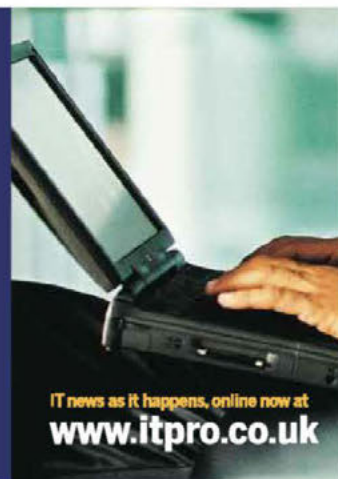
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Aaron

Flushed away

I have just read your reply to the printer jam problem. I had this problem many years ago and found a batch file online called printflush. This just needs to be placed on your computer (in my case the desktop), and if I get a printer jam I just double-click. The URL for the download is **brad-kovach.com/printflush**.

Keith

Batch files can be great little time savers and can also be very powerful tools for all sorts of uses. They can be used to automate a lot of tasks, including the steps I described for emptying or 'flushing' the print spooler. The batch file you found is just that, an automated script for fixing printer spool issues, and it makes it even easier to clear a clogged printer queue. Thanks for pointing this out.

However, there is a reason I often avoid recommending such fixes and that's security. Basically, downloading some types of file from the internet and running them can be dangerous, especially if you're

```

File Edit Format View Help
printflush - Notepad
@ECHO OFF
echo -----
echo Print Flush - 1.3 - By Brad Kovach
echo -----
echo.

echo Step 1: Stop the Print Spooler
echo -----
net stop spooler
echo.

echo Step 1.5: Reassigning Print Spooler Dependencies
echo -----
echo this step is important if you have a lexmark printer which screws up the services and may
echo make it impossible to start the print spooler
echo.
sc config spooler depend= RPCSS
echo.
echo Done!
echo.

echo Step 2: Erasing old chaf (junk printer documents)
echo -----
del /Q /F /S "%systemroot%\System32\Spool\Printer\*"
echo Done!
echo.

echo Step 3: Problems eliminated! Restarting printer services
echo -----
net start spooler
echo Spooler has been restarted!
echo.

echo Step 4: Try printing again.

```

▲ **Batch files utilise simple script commands to perform various tasks and can be very useful**

running automated scripts and you don't have the knowledge required to edit the file and check the code within to make sure it's safe.

If you trust the site, you should be fine, but often a search for files and scripts like this can point you to websites you've never visited before, so

you're in uncharted territory and won't know if the file you've downloaded is safe. In situations like this, I'd always urge caution.

The site you recommended, however, appears to be perfectly fine, and the batch file code is innocent and will do what is advertised.

Unhinged

I've had my HP laptop for only seven months, and already it's suffered a problem, which I'm hoping you can help with. I haven't dropped the laptop at all (at least I know I haven't myself. It's possible someone else in the house did, but no one is owning up), but one of the hinges that holds the screen onto the main unit appears to have snapped and broken off. Half of the hinge casing has come loose, and now the screen doesn't open properly and the frame surrounding the display has come loose.

If I look inside the split, it appears as though something has bent, but the screen works fine, so I'm not sure if any damage has been done.

Is it worth me taking the whole thing apart to try to fix it, and could this even be done?

I'm concerned I may do more damage than good, but I know leaving the hinge as it is will only lead to more damage anyway, so I'm between a rock and a hard place.

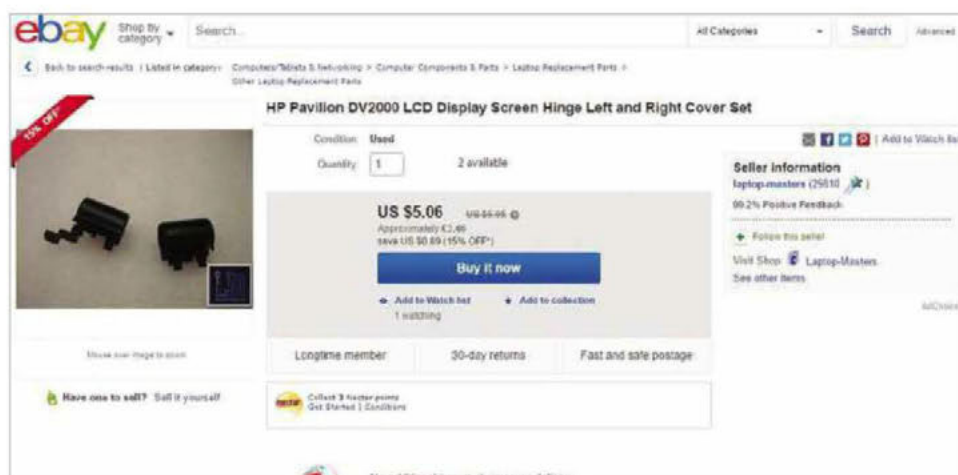
Gary

I think the key piece of information here is the seven-month period you've owned the laptop for. It sounds as though the hinge is damaged, therefore it should be covered by your warranty, which should be at least 12 months, meaning you're within the warranty period.

If this is the case, I'd hold off on any fixes and take the laptop back to the point of purchase. It should be covered as long as the damage wasn't caused by something not

included in the warranty. This should net you a replacement laptop or, at the very least, a full repair. Trying to do this yourself will likely void the warranty, so it's best to check first.

If your laptop is out of warranty and as long as you're confident in your abilities, you could try to fix it. Just be sure to be very careful and don't stress the components too much trying to get the hinge back into place. It may be best to crack the laptop open and remove the display so you don't damage any connectors or boards. If the hinge has actually broken, though, you may need to purchase a replacement from HP or even eBay.



▲ You can often find spare parts for PCs and laptops on eBay, and they're often cheaper than official sources

Missing DLL

I'm trying to load an application I recently purchased, but after installing it and trying to run it, I get an error message that says 'Api-ms-win-crt-string-l1-1-0.dll is missing', and it doesn't run. I installed the application as instructed and, as far as I'm aware, it did so properly, but it just won't work.

I've read that you can download .dll files from the internet, but I just find this a little worrying and I don't want to put anything untoward on my computer. Do you have any suggestions?

Ste

Downloading individual DLL files can be an easy way to fix missing DLL errors, but it can also be risky, and you're right to be cautious. DLL files are very important for software, but they're an easy vector for malware. There are many DLL websites and most are fine, but if possible I'd always suggest you try official support or solutions first.

In this case, the missing file seems to be related to Visual C++, which the application you're trying to run must use. For some reason, the file isn't present, so you'll need to grab it. You can do this easily by running a specific update from Microsoft's own website. You'll find this at support.microsoft.com/en-us/kb/2999226. This is an update for Universal C Runtime and it covers the missing DLL file you need.

Run this update and then reboot your PC. Once the update is complete, try running your application again and it should work fine. If it doesn't, try uninstalling the application and then reinstalling it.

If you really want to try adding the DLL yourself, one site a lot of people use is www.dll-files.com. I obviously

can't guarantee everything on this site is safe, but it's popular and site checking tools give it a green flag. Just remember to scan anything you download with antivirus, just to be safe.

▼ DLL download sites are usually safe, but could also be havens for malicious code, so always be careful



ASK JASON



Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
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30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

A Bit Of Bother?

I'm trying to upgrade my lad's old Socket 939 system to Windows 10 (before the July 29th deadline), but it keeps giving a BSOD on boot. I'm told everything used to work great, but all I'm getting since bringing it home with me is a TDR failure. The consensus online is that this is a graphics problem. I'd try a different driver if only I could get the PC to boot! The specs are as follows.

CPU: Athlon 64 X2 4800+ (2.4GHz, dual-core)
Motherboard: Gigabyte GA-MA69G-S3H
RAM: 4 x 1GB OCZ DDR2-6400
GPU: Radeon HD 6670 (silent)
OS: Windows 8 Pro (not 8.1)

I've tried reinstalling Windows 8 Pro, but the TDR error soon shows itself before the process finishes. I've reseated the graphics card, too and also the RAM. No dice. This leads me to conclude that there must be a hardware issue. What do you reckon?

Francis Kinsler, Gmail

TDR stands for 'timeout, detection, and recovery'. Yes, it's graphics-related – the driver is crashing and restarting. Maybe the driver's simply corrupted or buggy, though during an installation Windows will use its own generic driver, not one from AMD. I think you're right, then, Francis: the culprit is the graphics card itself. Perhaps it's been regularly overheating – a common scenario for fanless cards, especially if there's inadequate case cooling. A Radeon R7 250 (about £60) or GeForce GT 740 (about £70) would make a suitable replacement for a Radeon HD 6670.

Now, regarding Windows upgrades, I should mention that your lad's PC isn't in fact based on Socket 939. The motherboard is a Socket AM2 affair, and a Socket 939 CPU would use DDR (DDR1), not DDR2. That's all very good news, as

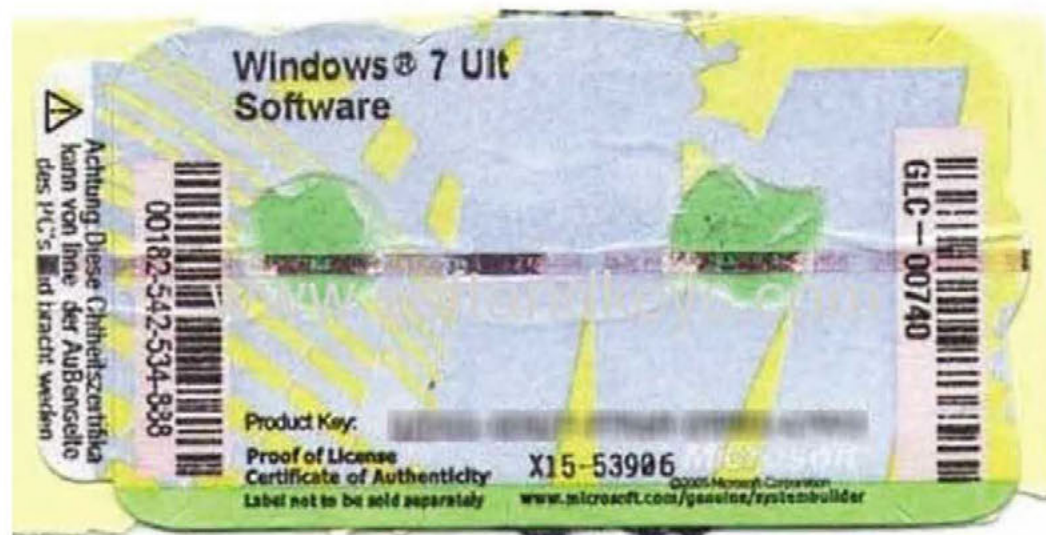
it means you're not missing CMPXCHG16b (also called CompareExchange128). This is an x86-64 CPU instruction that's almost essential these days. 32-bit versions of Windows are trouble-free, but without that instruction, 64-bit Windows 8.1 simply won't install (64-bit Windows 8 will). 64-bit Windows 10 can only be clean-installed, not upgraded to.

**“ Most in trouble
are those running
64-bit Windows 8 ”**

The users most in trouble are those running 64-bit Windows 8. They can't upgrade to 8.1, and without 8.1, they can't upgrade to 10. The answer is to wipe the PC clean and install 32-bit Windows 8. Afterwards, Windows Update can be used to upgrade to 32-bit Windows 8.1. From there, Windows Update can be used to upgrade to 32-bit Windows 10. Once that's activated, it's just a case of wiping the PC clean again and installing 64-bit Windows 10. It'll reactivate just fine. There's a commonly held myth that product keys and installations are locked to a specific bit-depth, but it's just that: a myth.

PS – Windows 10 downloads are available here, legitimately: goo.gl/jECLtx. Getting hold of Windows 7 and 8.x downloads might require a visit to a torrent site, however. Yep – I did say that. In my view, anyone with the right to run the software has the right to acquire the installation media, by whatever means necessary.

▼ Does Microsoft care if you switch between 32-bit and 64-bit on the same licence?



Over The Limit

In a moment of madness (it cost over £600), I recently bought a Galaxy S7 Edge smartphone. I love my music and want to carry as much of my collection around as possible, so I was thinking of buying a 256GB memory card. However, the manual for the phone states the biggest card supported is 200GB. Will a 256GB card work?

N Ferguson, Cheshire

A 256GB card **should** work. The SDXC standard – common for a few years now (SD/SDSC and SDHC having been superseded) – supports capacities from 64GB to 2TB. The S7 Edge specs specify a maximum capacity of 200GB, it's true, but that's merely because until recently that was

the biggest microSDXC card available. It was made by SanDisk – still is. *

Of course, technology improves, and shrinks, and now Samsung has managed to squeeze 256GB into the same form-factor. 512GB cards can't be far behind (full-size cards are already here), and I doubt most devices with an SDXC slot will have trouble with those either.

But be careful. Those 256GB Samsung cards are rare. Indeed, on a quick scout, I can't find any genuine ones for sale – and that's a key word: genuine. You'd be a mug to buy a 256GB card from anywhere but a well-known retailer, as fake cards are everywhere (that's solid advice for memory cards and USB sticks in general). Currently, Samsung is the only manufacturer, so if you see 256GB cards labelled up with a different name or a 'Samsung' card with a



▲ Will this work in a phone with a 200GB limit?

price south of about £125, keep your wallet in your pocket.

* Although the company's now owned by Western Digital.

Dell Of A Deal

I'm after an inexpensive desktop PC for the usual basic stuff, and at www.ebuyer.com I've spotted the Dell PowerEdge T20 (model 20-3692). It's priced at £162.99, but it's on a £70 cashback deal. So unless there's a catch, just £92.99 will get me a full PC with a Pentium G3220 processor (3GHz, dual-core), 4GB of DDR3 RAM and a 500GB hard drive. Is it some sort of con? There's no OS, but that doesn't worry me. Would there be upgrade potential, perhaps for gaming?

Shaun, Gmail

I've just totted up the cost of doing a self-build using similar components. About £154, I reckon. Even at full price, then, Shaun, the Dell is great value. It's no rocket ship, but for day-to-day use it'll be grand (ignore that it's advertised as a server). There are plenty of USB ports, a raft of drive bays, gigabit Ethernet, a PCI slot, and even serial and PS/2 connections. You don't get a DVD drive, though. If that's a problem, throw a laptop-style job into your basket. Bear in mind, too, that the video outputs are 1 x VGA/D-sub and 2 x DisplayPort. No HDMI.

And while we're on that subject, could the system be made into a gamer? Well, the Pentium's integrated HD Graphics will handle little more than Candy Crush Saga, but there's a PCIe 3.x x16 slot for adding something beefier. For any card requiring a dedicated power cable, you'd need to replace the 290W PSU and buy a £2.99 ATX adaptor off eBay (the motherboard's PSU socket is non-standard). And remember that a lowly Pentium would hold many games back. Really, if you think you'll want to play games, this Dell isn't the right starting point.

There's no OS, as you say. If you're not already sorted there, head to eBay. A Windows 10 key can be bagged from as little as £6.99 – even the Pro version. A key for Windows 8.x is similar money (if you've lost your marbles).† I've no idea how such keys can be so cheap, and they appear to be legit. Some of the listings are weeks old, maybe months old, and eBay's red hot with its Verified Rights Owner programme (VeRO). Dodgy software doesn't last five minutes.

How does the cashback work? It's not a con, Shaun. The system has to be bought between 1st May and 31st July (still plenty of time), and you need to make the claim 30 to 60 days after purchase. That's it. Once the claim's authorised, the refund will come through within 30 days. Follow the rules and you'll get the money. See goo.gl/Sv39BD for more details. The offer is run by Dell, not Ebuyer, so feel free to buy from whichever authorised Dell reseller has the best price.

All in all, for under £100, you could have a brand-new Dell desktop running Windows 10. It's daylight robbery! If any readers have some spare cash, why not buy and set up several? Knock 'em out on eBay at £175 a pop. Dell allows ten claims per individual or organisation. A nice little earner and no mistake.

† Windows 7 keys can be found for around a tenner, though usually they come as stickers retrieved from scrapped towers and laptops. Windows 10 and 8.x keys come as 'digital purchases' – that is, emails.

▼ They appear to be legit, so how come they're so cheap?



Crowdfunding Corner

A lot of tech-based crowdfunding projects are concerned with making accessories for tablets and smartphones. This week, we're glad to show you a pair that revolve around the most traditional PC hardware you can imagine: a keyboard and a mouse.

SilentKeys: A Keyboard that Protects your Privacy & Security

SilentKeys is a Plug & Play keyboard that helps protect you online by offering easy, quick access to a completely secure environment at the touch of a key. By pressing the secure button, you can either open a fully anonymised browser or boot your system into a completely secure environment with a secure file vault and encrypted network features. You're then free to type safe from software or hardware interception.

The idea is that the keyboard will protect your data from interception and viruses, while helping you keep your private files secure on the go. Each SilentKeys package contains a keyboard in either black or white, a 16GB micro-SD card, a USB cord and dice. The keyboard itself is housed inside a tamper-proof aluminium shell, so you know they take security very seriously.

There are some ultra-cheap early bird tiers available, but at the current pace those will probably be gone by the time you read this. If you want to get a keyboard, we think the best price you'll be able to catch is €169 (£130), which is still a hefty chunk off the €249 (£190) price. With over a month to go, the campaign already has more than 80% of its goal, so we think this one's definitely happening.

URL: kck.st/1TBuCWl

Funding Ends: Friday, 1st July 2016

MouseDrive. Turn Your Mouse Into A Personal Wireless Cloud

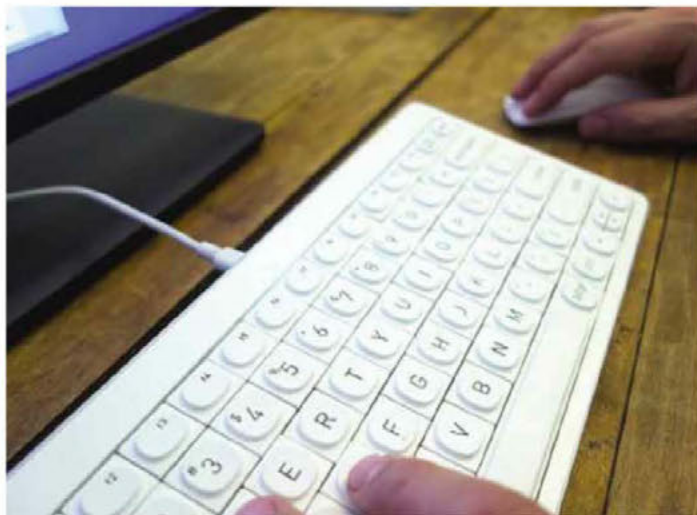
The MouseDrive combines the technology of both the mouse and external hard drive to create one ergonomic device. Compatible with both PC and Mac, Android and more operating systems besides, the MouseDrive saves space and improves portability by combining two common devices into one.

The hardware is USB 3.0 compatible, has an on-board flash drive (so no moving parts for data storage) and a high-impact casing. When wired, it's powered completely from your USB port, so there's no need to swap and reinstall batteries, and when disconnected it runs off its own internal li-on battery charged through the USB connection.

Early backers can pick up a 16GB wired MouseDrive for 20% off retail, at a price of \$66 (£46). At the other end of the spectrum, you can get a 512GB Wireless Mousedrive for \$199 (£137), and if you want anything smaller, there are various tiers between the two as well. If the campaign hits its \$49,000 (£34,000) goal, units will start shipping in December 2016.

URL: kck.st/1sACa0d

Funding Ends: Friday, 1st July 2016



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

Monument Valley

We fall into the mind-altering perspective of a mobile game this week

I'm a little late to the party where some Android games are concerned. True, I do play a fair few games on my phone and tablet, but I'm an old school gamer at heart, so I tend to opt for PC or, at a push, console gaming instead of mobile games, which are often of a lower quality.

However, in the last few weeks I've been working my way through the rather excellent *Monument Valley*. It's been out a long time, but I thought I'd share with you, just in case you also missed this startlingly good adventure puzzler.

Escher's World

Monument Valley has you playing as Princess Ida, who must work her way through ever increasingly complex geometric puzzles of an MC Escher variety, to find the missing components of an ancient world and ultimately seek forgiveness from higher beings

for stealing the game world's Sacred Geometry.

The game is played out in a dimensionally confusing isometric view of paths, ladders, lifts and other such moving sections. To move from one end of the play area to the other requires you to manipulate the game world by twisting your perspective through moving platforms, rotating sections of a building and even, at times, walking upside down.

The trick here is to forget all about real-world physics. For example, where you'd view four pillars, each separated from one another in the shape of a square, there's no way you'd be able to cross from one to the other without having to traverse a platform between them. In *Monument Valley*, though, by rotating the scenery, you change the perspective so the top of the closer pillar (in a 3D isometric view) looks like it's

Features At A Glance

- Stunning graphics.
- Immersive gameplay.
- Great puzzles and geometric designs.
- Beautiful musical score and sound effects.

touching the further one. You can then move Ida from one pillar to the next in this fashion.

The puzzles are based on the geometry of the world, but they also have you moving blocks around, opening doors and setting off pressure pads to unlock or release a new section. Often there are pressure pads that are released as soon as you move off them, so you'll need to work out a way to keep something over the pads to permanently activate them.

However, it's not just the minimalist graphics, the excellent sound effects and superb geometry puzzles that keep you hooked. *Monument Valley* is also an evolving story that's really quite gripping – making you want to play the next level to reveal the next chapter.

Conclusion

Although it was released a couple of years ago, *Monument Valley* has aged well. It does cost £2.99, but considering it's such a great game, I don't mind spending such a small amount.

There aren't many mobile games that stick with you, but I think *Monument Valley* may well be one that remains installed on my tablet for the foreseeable future.



▲ Graphically, *Monument Valley* looks fantastic



▲ It's a geometric enthusiast's dream come true



▲ The story behind *Monument Valley* captures you as much as the puzzles

Logging Off

In 1984, I bought my first Marantz CD player, along with a version of Vivaldi's *Four Seasons* and *Brothers in Arms* by Dire Straits. It was a seminal moment, and at the time I couldn't imagine a time I'd treat this media – and its replacements – with such little respect.

At this time, I've long since relegated my CD collection to the attic and given or thrown away most of my DVDs, and I'm

wondering why my Blu-ray collection is still on a shelf when the PS3 that can play them isn't even wired up!

But an even greater problem for me are the literally hundreds of PC-related discs I've accrued and my overriding urge to just bin them. Some contain software, others data files, tutorials or documentation, but it's almost all irrelevant to what I do today in one way or another.

What I've decided to do (and even I admit this is somewhat OCD) is to sift through it and isolate those things I'd really like to keep, for whatever reason. And then, so that this all becomes a bit more manageable, I'm going to take groups of relevant disc data and assemble them onto Blu-ray media.

At least that will reduce some of the clutter, especially when you consider that you can get the contents of at least 35 full CDs onto a single sided Blu-ray disc, and even five single-layer DVDs on one.

For those wondering, I've already accepted that if I live long enough, I'll end up with one disc that have everything I want to pass on stored on it, should Blu-ray ever be superseded in any meaningful way.

But surely the replacement for discs will either be cloud based, if you trust that and the businesses that underpin them, or more believably a solid-state device with tens of terabytes on it.

And surely such an external drive is only a couple of years away, and probably one with a petabyte, being 1,000 terabytes (TB) or 1,000,000 gigabytes (GB) is foreseeable within a decade or so. That could do plenty for decluttering my home, should those things come to pass.

The only caveat I can see to all this reorganisation is the way that media and the connection technologies that they use are as equally transient. I often come across old storage technology, like disks from

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long discarded systems to the very early flash cards and wonder if there is anything on them.

With no way to read practically read them, the temptation is often just to bin them and fret no more, because irrespective of my interests, archiving isn't my life, and it isn't my object to build a museum honouring my existence in this era.

Surely, unless you're a megalomaniac, life is all about what you do during it than the scale of legacy you leave? Not that I'm doing anything remarkable with mine, but equally I'm not conscientiously attempting to be a goldmine of information for a future historian to delve through centuries from now.

In the end, they're just discs, digitally encoded with a laser that was once considered an impressive technology. Or given a few decades, they're rubbish that isn't easy to recycle even if they contain some valuable materials.

And once you think about it that way, they're easier to bin.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: 7 Expression Web, 8 Tsetse, 9 Encode, 10 OneNote, 12 F Flat, 14 Snide, 16 Falsify, 19 VGACAD, 20 Thumbs, 22 Andy Hertzfeld.

Down: 1 Axis, 2 Triton, 3 Aspects, 4 Pixel, 5 UNICEF, 6 Red Dwarf, 11 Nonagons, 13 Cantata, 15 Dactyl, 17 Stuffy, 18 Idler, 21 Bulb.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. For many, many years now, we've followed this magazine's disclaimer with a bit about what's been happening with the Micro Mart team or what we've been thinking about during the week. This time around, we'd like to follow the normal disclaimer with another disclaimer, in honour of the Norwegian

Consumer Council's campaign against ridiculous terms and conditions. Of course, this is just for fun, so please don't sue us. Anyway, here we go. First, by reading this disclaimer, you agree to forthwith forfeit all assuant propulatory actions that would otherwise be assured by your implied agreement. Secondly, you will not mention the made-up words we used in that last sentence or the fact it made no sense. Thirdly, you are to tell all your friends and family how great Micro Mart is, and tell them to buy a subscription. Fourthly, you will follow us on Twitter and like our Facebook page, and we'll agree not to online stalk you. Fifthly, if you ever play us at Scrabble or Word With Friends, you have to let us win by at least 34 points. Sixthly, thanks for reading.

THIS WEEK'S CROSSWORD

Across

7 A specific area of the celestial sphere as defined by the International Astronomical Union. (13)

8 A sequence of characters that define a search pattern, mainly for use in pattern matching with strings. (Abbr) (6)

9 Being up to a particular standard or level especially in being up to date in knowledge. (2,4)

10 The trade name for a shortwave antenna marketed by Bilal Co. for use as an amateur radio transmitting antenna for restricted spaces. (7)

12 A community or territory over which a sovereign rules; it is commonly used to describe a kingdom or other monarchical or dynastic state. (5)

14 A subatomic particle, such as a photon, which has zero or integral spin and follows the statistical description given by Bose and Einstein. (5)

16 A regular and intelligible form or sequence discernible in the way in which something happens or is done. (7)

19 A number crossword-style puzzle in which each row and column of consecutive numbers must add up to the total given at the start of each slot. (6)

20 A satellite of Saturn, the furthest from the planet and with an eccentric retrograde orbit. (6)

22 A substance that flows like a liquid but has some degree of ordering in the arrangement of its molecules. (6,7)

Down

1 The world's first eye tracking virtual reality headset. (4)

2 The act of changing location in an upward direction. (6)

3 The marketing name used by AMD for several different budget desktop CPUs that replaced the Duron. (7)

4 Give an additional equivalent more user-friendly name to an entity, (5)

5 Restrain a reaction or stop oneself acting on an emotion. (6)

6 A type of app that aims to create a shared virtual reality space where users can interact with each other and even participate in activities. (6,2)

11 .sk TLD. (8)

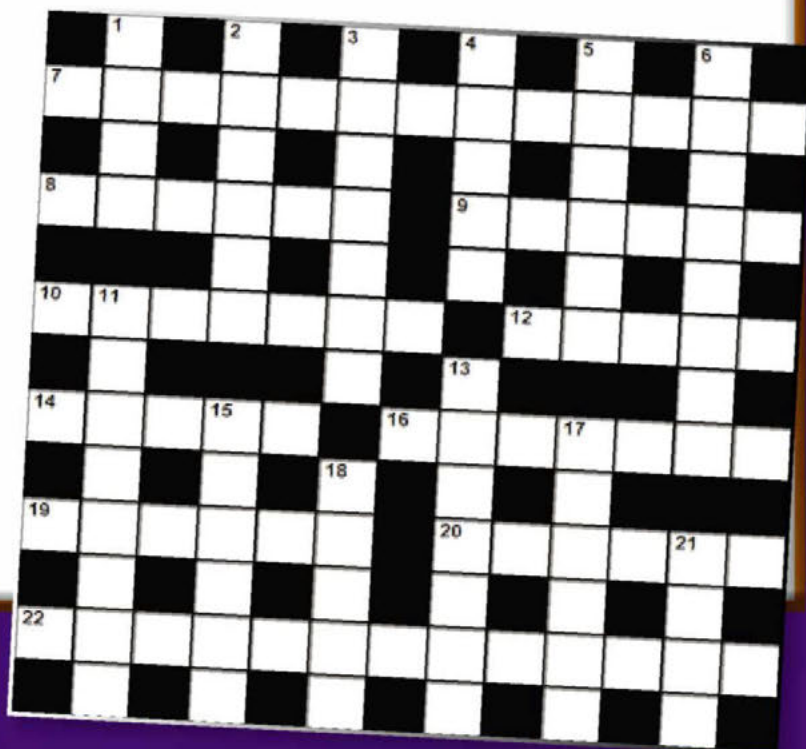
13 Trusteer's online security software application. (7)

15 American virtual reality technology company founded by Palmer Luckey and Brendan Iribe 2012. (6)

17 A Chinese philosophy based on the writings of Lao-tzu, advocating humility and religious piety. (6)

18 Codename for a British Secret Intelligence Service operation to penetrate the Polish security establishment in the early 1960s. (5)

21 In statistics the difference between the expectation value of an estimator and the true value. (4)



In Next Week's Micro Mart*

- Home security special! IP cameras, smart locks and more
- Books and apps for aspiring coders
- What to do after your free Office 365 subscription runs out
- Plus the usual mix of news, features, reviews and advice



* May be subject to change

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